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ADAMS'S PRIMARY ARITHMETIC.

PRIMARY ARITHMETIC,

OR,

MENTAL OPERATIONS IN NUMBERS:

BEING

AN INTRODUCTION

TO THE

REVISED EDITION OF ADAMS'S NEW ARITHMETIC.

DESIGNED FOR THE USE OF SCHOOLS AND ACADEMIES.

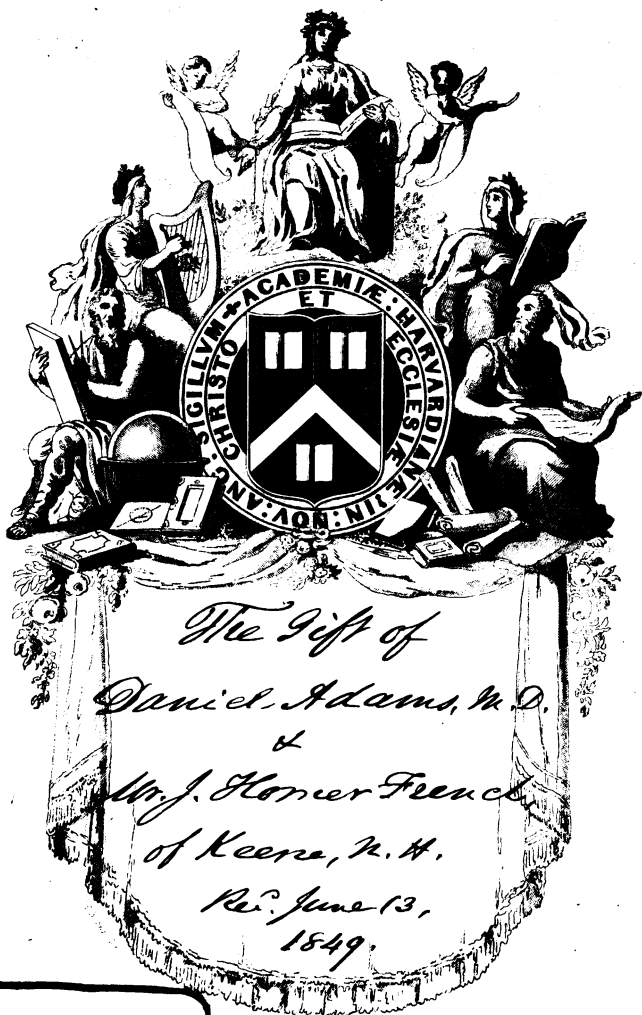
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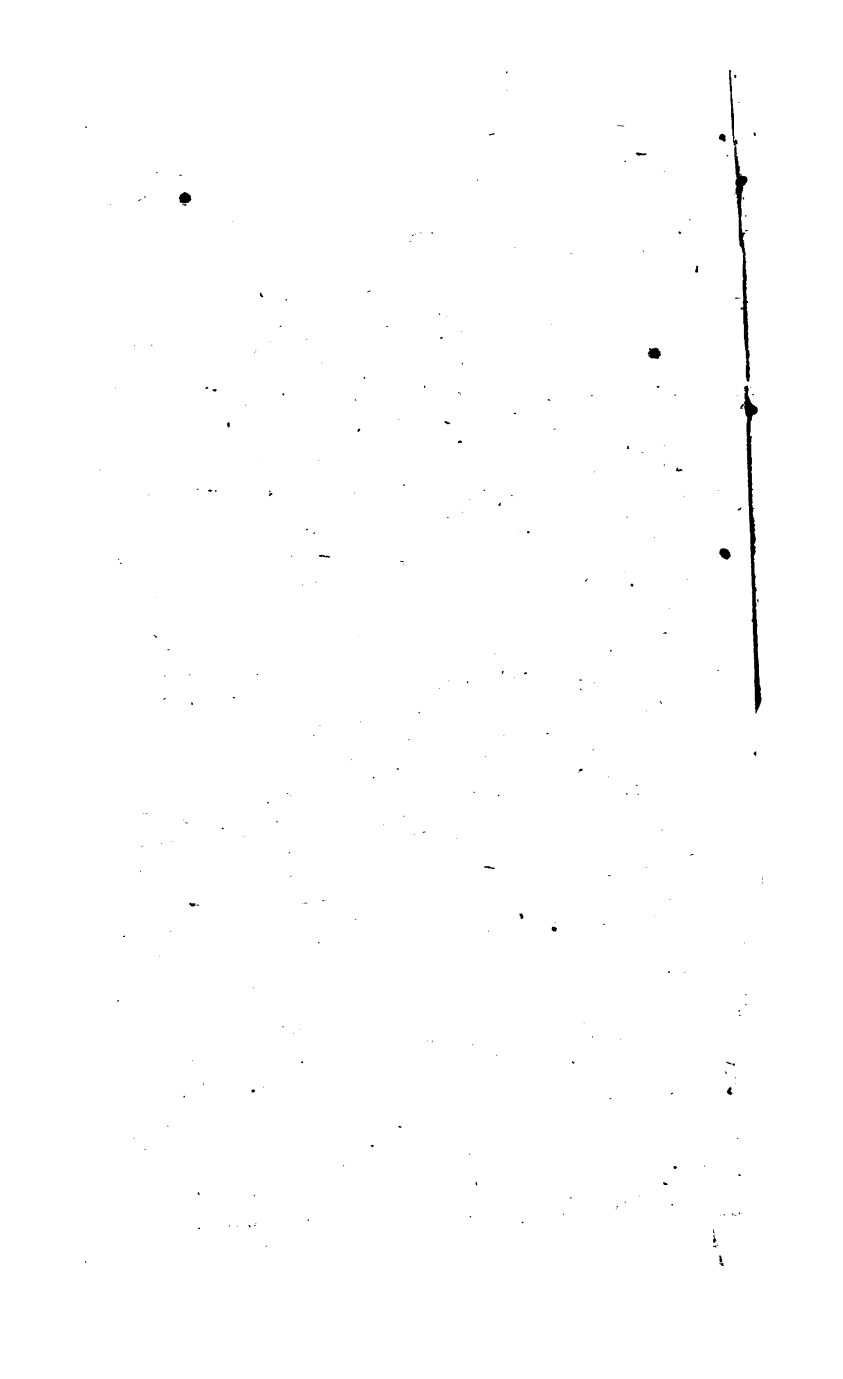
The Gift of
Daniel Adams, M.D.,

&

Mr. J. Homer French
of Keene, N. H.,

Recd. June 13,
1849.





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1849, June 13

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PREFACE.

THE introduction of the analytic or inductive method of instruction is ascribed to PESTALOZZI, a late distinguished teacher in Switzerland. He applied this method to Arithmetic, and to the other sciences, and thus did much in advancing the great cause of Education.

The inductive method was first successfully applied to Mental Arithmetic, in our own country, by WARREN COLBURN. Since the publication of "Colburn's First Lessons," the importance of the study of Mental Arithmetic has been steadily gaining favor, till, at this time, a knowledge of this branch is considered indispensable to a good English Education. Indeed, many popular educators maintain that, if but one can be obtained, a knowledge of Mental Arithmetic is preferable to that of Written. However true this may be, it is certain that the pupil who has a thorough knowledge of the former, invariably advances in the study of the latter with much greater facility, and with a clearer understanding of the subject, than the pupil who has had no proper mental discipline in numbers.

The following work, designed as an introduction to the study of Arithmetic, is adapted to the gradual expansion of the intellect of the young pupil, and is also designed to give him as thorough mental discipline as is obtained by studying any other elementary work upon the same subject. The work is divided into two parts. In Part First stars are placed at the head of the lessons in Addition and Subtraction. These are designed for counters to assist the pupil in preparing his lessons; they may be used in the class at the discretion of the teacher. In Multiplication and Division, that part of the multiplication or division table with reference to which the lesson is arranged, is placed at the head of the lesson.

After a few examples have been presented in any rule in Part Second, the operation is defined, and the terms and signs used in performing examples under the rule are explained. The manner of performing operations upon tens and units is distinctly brought out, and forms an important item in the fundamental rules.

Part First is designed for beginners, and should in all cases be completed before the pupil commences either Part Second, or Written Arithmetic. Part Second may be completed before the pupil takes up Written Arithmetic, or it may be used in connection with the "New Arithmetic," the arrangement of the subjects being the same as that in the latter work.

The work commences with the simplest combinations of numbers, and advances to those that are more difficult no faster than the pupil is prepared to master them.

The examples are mostly of a practical nature, and being deduced from every day business transactions, are at once interesting and instructive.

Different forms of solution are given, which, with slight modifications, may be applied to any example contained in the work. These forms require the pupil to give a reason for each step in the solution, and from the reasoning to draw a conclusion.

Notes and suggestions to teachers are placed at the end of the book, reference being made to them in all cases where they will apply. This arrangement places a valuable key in the hands of the young teacher, to which the pupil will seldom refer.

The design of the author in the preparation of the work has been, to lead the pupil on step by step, wholly in the order of discovery. This arrangement is based upon the principle, that "If the understanding is thoroughly reached, the memory will take care of itself."

ADAMS'S ARITHMETICAL SERIES,

FOR SCHOOLS AND ACADEMIES.

I.—PRIMARY ARITHMETIC, OR MENTAL OPERATIONS IN NUMBERS : being an introduction to the REVISED EDITION OF ADAMS'S NEW ARITHMETIC.

II.—ADAMS'S NEW ARITHMETIC, REVISED EDITION ; in which the principles of operating by numbers are analytically explained and synthetically applied. Illustrated by copious examples. -

III.—KEY TO THE REVISED EDITION OF ADAMS'S NEW ARITHMETIC.

IV.—MENSURATION, MECHANICAL POWERS, AND MACHINERY. The principles of mensuration analytically explained, and practically applied to the *measurement of lines, superficies, and solids* : also, a philosophical explanation of the *simple mechanical powers*, and their application to *machinery*.

V.—BOOK-KEEPING, in which are contained a lucid explanation of the science of accounts ; a new, concise, and common-sense method of BOOK-KEEPING BY SINGLE ENTRY ; and various forms of *receipts, orders, notes, bonds, mortgages*, and other instruments necessary for the transaction of business. Accompanied with BLANK BOOKS, for the use of learners.

ADVERTISEMENT.

The Primary Arithmetic, the Treatise on Mensuration, and the Book-keeping, have been mainly prepared, under my supervision, by Mr. J. HOMER FRENCH, of New York, who rendered important assistance in revising my New Arithmetic.

From my knowledge of his ability, and from a careful examination of the works, I can confidently say they meet my approbation.

DANIEL ADAMS.

Keene, N. H., August, 1848.

MENTAL ARITHMETIC.

PART FIRST.

INTRODUCTION.*

No child should commence the study of Arithmetic without being able to count one hundred, and to understand clearly what is implied by each of the names used in expressing the several numbers. Therefore, the *first step* to be taken by the teacher in using this work is, to ascertain the extent of the knowledge of numbers that each member of the class possesses; and if any one is found who cannot distinguish clearly how many things are meant by each number, to proceed with the class to count one hundred.

The Numerical Frame affords the most convenient means for counting, and for adding, subtracting, multiplying, and dividing; and a teacher who has once used it, will never after teach beginners in Mental Arithmetic without it. It should be found in every school-room, and if not found there, it may be obtained by the teacher at a trifling expense. In the absence of a Numerical Frame, pieces of wood or leather, peas, corn, apples, pebbles, &c., may be used for counters.

No directions can be given for teaching pupils to count, which will apply in all cases, yet the following suggestions may afford some aid to the inexperienced teacher.

1st. Be satisfied that your pupils can count ten, and that they *understand* what is meant by the names of the numbers. For example, you may require them to count the fingers on one hand, then on the other, and then on both. Next call upon some one to hold up three fingers, another

* See Method of Conducting Classes, page 179.

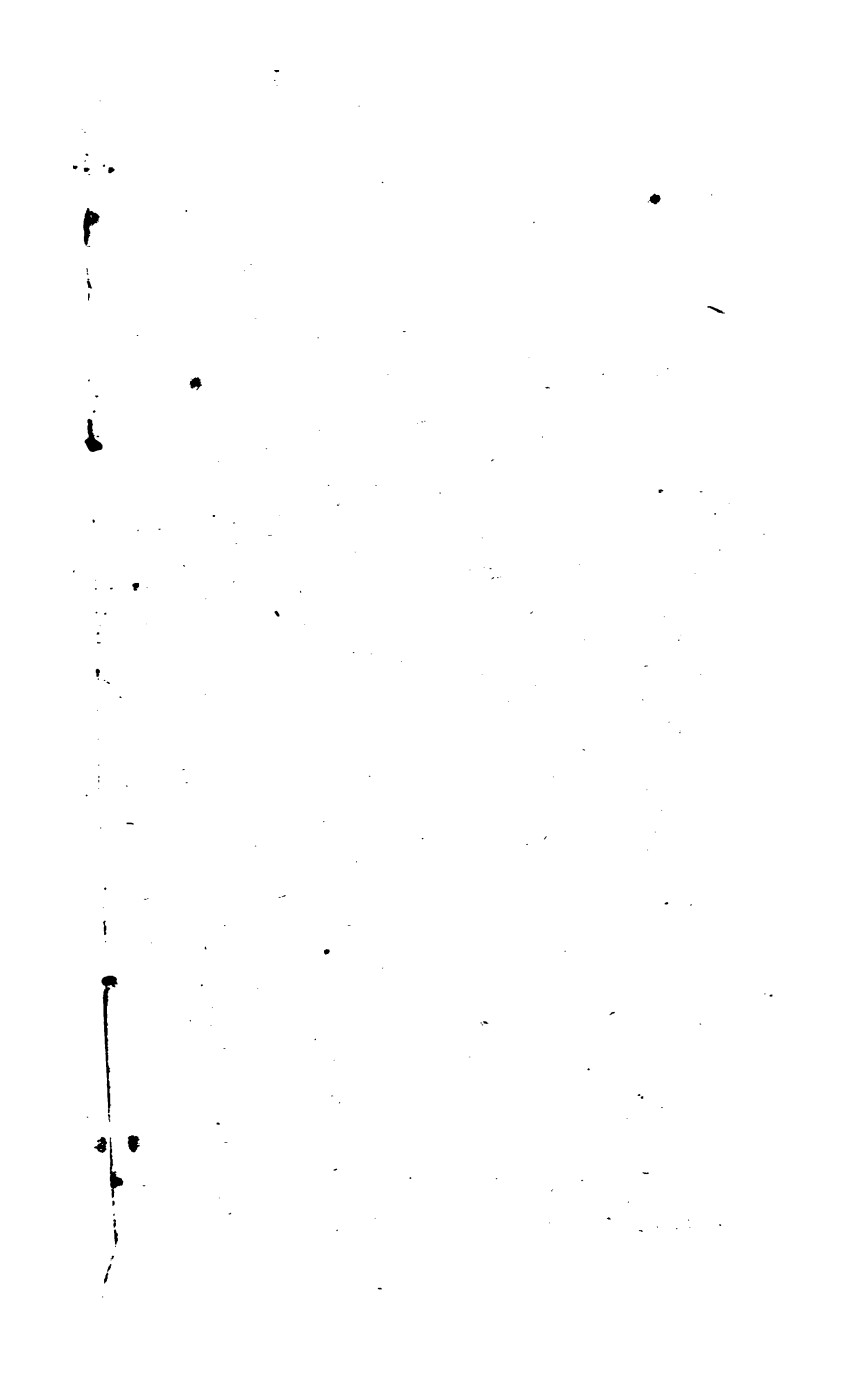
to hold up six, another two, another five, &c. Then require one to count the windows, another the chairs, another the girls in the class, and vary the exercises upon any number of things not exceeding ten.

You should next exercise their knowledge of the terms used, by asking them which is the greater, eight or five, seven or nine, ten or three; and which is the less, six or two, seven or six, four or nine, &c.; and also by applications to visible objects, such as apples, marbles, chairs, boys, girls.

2d. After being fully satisfied that every member of the class can count ten understandingly, you may require the class to count from ten to twenty in the same manner as before, taking care that you *proceed no faster than they understand all that is said and done*. First make your application to visible things, and after the class understand the application, you may proceed with abstract numbers, thus: which is the most, nine or sixteen? — twelve or twenty? — eight, thirteen, or seventeen? &c., multiplying questions at pleasure.

3d. After the class can count twenty understandingly, you may proceed with them in the same manner, to count thirty; then forty, fifty, sixty, seventy, eighty, ninety, and one hundred; taking care to advance no faster than they understand and comprehend the meaning of each number.

The length of time employed in these exercises must be adapted to the circumstances. Some classes will understand the whole in one lesson; others will require from three to six, and even more, lessons, before they can comprehend the full meaning, and count readily.



MENTAL ARITHMETIC. PART I.

nd one? — six and one? — one and ten? — one and even? — five and one? — one and eleven? — nine and one? — twelve and one?

LESSON SECOND.

* * * * *

1. A careless girl lost two pens one day, and one pen the next; how many pens did she lose?

Answer. She lost three; because two and one are three.

2. There were two birds on a fence, and two more lighted near them; how many birds in all? Two and two are how many?

3. In one class are two girls and three boys; how many pupils in the class? Two and three are how many?

4. There are two houses on one side of the road, and four on the other; how many houses in all? Two stars and four stars are how many stars?

5. A farmer put two cows into a field with five more; how many cows were in the field? Two and five are how many?

6. An idle boy was absent from school two days one week, and six days the next; how many days was he absent in the two weeks? Two stars and six stars are how many stars?

7. A man gave two dollars for a sheep, and seven dollars for a calf; how many dollars did he pay out? Two and seven are how many?

8. A cook used two pounds of lard one day, and eight pounds the next; how many pounds did she use in the two days? Two and eight are how many?

9. If a slate cost nine cents, and a pencil two cent how many cents will it take to buy a slate and a pencil? Nine and two are how many?

10. A horse travelled ten miles in one hour, and two miles the next; how many miles did he travel in the two hours? Two and ten are how many?

11. George had eleven cents, and his father gave him two more; how many had he then? Two and eleven how many?

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By Adams's New Arithmetic

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KEENE, N. H.:

PUBLISHED BY J. W. PRENTISS & CO.

sold them to David for three shillings more than they cost him; how much did David give for the skates? Three and ten are how many?

11. Susan read eleven pages in her new book in one day, and three pages more in the evening; how many pages did she read in all? Three and eleven are how many?

12. How many stars are three stars and twelve stars?

13. *How many are* twelve and three? — eleven and three? — ten and three? — nine and three? — eight and three? — seven and three?

14. *How many are* three and one? — three and two? — three and six? — five and three? — three and three? — three and four?

LESSON FOURTH.*

* * * *

* * * * *

1. A man who had four cows, bought one more; how many cows had he then?

Answer. He had five; because four cows and one cow are five cows.

2. There are four pictures in one book, and two in another; how many pictures in both books? Four and two are how many?

3. There are four books on one shelf, and three on another; how many books on both shelves? Four and three are how many?

4. In one lot are four cows and four oxen; how many cattle in the lot? Four and four are how many?

5. Ann put four sheets of paper into her copy-book, and Ellen put five sheets into hers; how many sheets of paper did they both use? Four and five are how many?

6. A boy gave four quills for a ball, and six for a ball club; how many quills did he give for both? Four and six are how many?

* See Note 2.

7. There are four horses in one barn, and seven in another; how many horses in both barns? Four stars and seven stars are how many stars?

8. *How many apples are four apples and eight apples?* — eight apples and four apples?

9. William gave away four apples, and had nine left; how many apples had he at first? *How many are four and nine?* — nine and four?

10. Fanny's silk dress cost ten dollars, and her new bonnet four dollars; how many dollars did they both cost? Four and ten are how many?

11. Thomas sold his colt for eleven dollars, and his two sheep for four dollars; how many dollars did he get for the colt and the two sheep? *How many are four and eleven?* — eleven and four?

12. A farmer gave a barrel of pork for twelve yards of cloth, and three cords of wood for four yards more; how many yards of cloth did he purchase? *How many are four and twelve?* — twelve and four?

13. *How many are four and one?* — four and twelve? — four and two? — four and eleven? — four and three? — four and ten? — four and four? — four and nine? — four and five? — four and eight? — four and six? — four and seven?

LESSON FIFTH.

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1. In a room five men are sitting in chairs, and one man is lying on a bed; how many men in the room? Five and one are how many?

2. In a book-case there are five books with blue covers, and two with red ones; how many books in the case? Five and two are how many?

3. A man paid five dollars for cloth, and three dollars for salt; how many dollars did he pay out? Five and three are how many?

4. In a certain family five of the boys wear hats, and

four wear caps; how many boys in the family? *How many are five and four? — four and five?*

5. Jane wrote five words on the blackboard, and five more on her slate; how many words did she write? Five stars and five stars are how many stars?

6. In a pasture there are five black sheep, and six white ones; how many sheep in the pasture? Five and six are how many?

7. *How many cents are five cents and seven cents? — seven cents and five cents?*

8. A teamster fed his horses five bushels of oats one week, and eight bushels the next; how many bushels of oats did he feed his horses in the two weeks? *How many are five and eight? — eight and five?*

9. There are nine boys in the first reading class, and five boys in the second; how many boys in the two classes? Five and nine are how many?

10. One piece of cloth contains five yards, and another piece contains ten yards; how many yards of cloth in the two pieces? Five and ten are how many?

11. Byron hoed eleven rows of corn, and James hoed five rows; how many rows of corn did they both hoe? Five and eleven are how many?

12. Harry dug twelve bushels of potatoes in one day, and Frank dug five bushels more than Harry; how many bushels did Frank dig? Five and twelve are how many?

13. *How many are five and one? — five and two? — five and five? — five and six? — five and nine? — five and ten? — five and three? — five and four? — five and seven? — five and eight? — five and eleven? — five and twelve?*

LESSON SIXTH.

1. On the shelf are six large plates, and one small one; how many plates on the shelf?

Answer: There are seven; because six plates and one plate are seven plates.

2. If you have six cherries in your right hand, and two in your left, how many will you have in both hands?

3. Mary has six quills, and Fanny has three more; how many have both? Six and three are how many?

4. On a shelf are six large mirrors, and four small ones; how many mirrors on the shelf? *How many are six and four?* — four and six?

5. There are six flowers on one stalk, and five on another; how many flowers on the two stalks?

6. There are six boys and six girls in the same class; how many in all?

7. Thomas had six white marbles, and seven gray ones; how many marbles had he?

8. Nathan is six years old, and his sister, Emily, is eight years older than he; how old is Emily?

9. Little Oscar had six peaches, and his uncle, Henry, gave him nine more; how many peaches had he then?

10. How many miles are six miles and ten miles?

11. How many pounds are eleven pounds and six pounds?

12. *How many stars are six stars and twelve stars?* — twelve stars and six stars?

13. *How many are ten and six?* — six and ten? — six and eleven? — eleven and six? twelve and six?

14. *How many are six and one?* — six and two? — six and three? — four and six? — five and six? — six and six? — six and seven? — six and eight? — nine and six? — ten and six? — eleven and six? — six and twelve?

LESSON SEVENTH.

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1. John worked seven days for one man, and two days for another; how many days did he work for the two men? Two and seven are how many?

2. On a barn were three robins, and seven swallows; how many birds were on the barn?

3. One week George got four merit marks, and the next week seven; how many merit marks had he? Four stars and seven stars are how many stars?

4. In one nest are five eggs, and in another seven; how many eggs in both nests?

5. In a yard seven boys are playing ball, and six are playing marbles; how many boys in the yard? *How many are six and seven? — seven and six?*

6. A blacksmith shod seven horses one day, and seven the next; how many horses did he shoe in the two days?

7. Jane had seven yards in her new dress, and Ann had eight yards in hers; how many yards in the two dresses? Seven and eight are how many?

8. William has seven rabbits, and his brother, Horace, has nine; how many rabbits have they both together?

9. One boy gave a blind beggar seven cents, and another boy gave him ten cents; how many cents did he receive? Seven and ten are how many?

10. Richard had eleven marbles, and he bought seven more of John; how many marbles had he then? *How many are eleven and seven? — seven and eleven?*

11. Betsey spun seven knots of yarn in one day, and Nancy spun twelve knots; how many knots did they both spin? Seven and twelve are how many?

12. On election day Tom spent three cents, Dick seven cents, and Harry five cents; how many cents did they all spend? Three, and seven, and five, are how many?

13. *How many are seven and seven? — seven and eight? — seven and nine? — seven and six? — seven and five? — seven and four? — seven and twelve? — seven and eleven? — seven and ten? — seven and one? — seven and two? — seven and three?*

LESSON EIGHTH.

* * * * *

* * * * *

1. In the entry to a school-house are two shelves. On one shelf are eight caps, and on the other two caps; how many caps on both shelves?

Answer. There are ten; because eight caps and two caps are ten caps.

2. A peddler has two bundles of gloves. In one bundle are eight pairs of gloves, and in the other bundle three pairs; how many pairs of gloves has he?

3. In a cage are eight old birds, and four young ones; how many birds in the cage?

4. There are eight girls in one class, and five in another; how many girls in the two classes? *How many are eight and five? — five and eight!*

5. One boy has eight apples in his basket, and another boy has six in his; how many apples in the two baskets?

6. How many trees are eight trees and seven trees?

7. How many boards are eight boards and eight boards?

8. Two men bought a cow. The first man paid eight dollars, and the second man paid nine dollars; how many dollars did the cow cost? Eight and nine are how many?

9. A boy picked up eight bushels of apples in the forenoon, and ten bushels in the afternoon; how many bushels did he pick up in the day? Eight stars and ten stars are how many stars?

10. How many days are eight days and eleven days?

11. A tailor sold a coat for twelve dollars, and a cloke for eight dollars; how many dollars did he receive? *How many are twelve and eight? — eight and twelve?*

12. Harry gave eight cents for a knife, four cents for a top, and two cents for a dozen marbles; how many cents did he pay out? Eight, and four, and two, are how many?

13. *How many are eight and three? — eight and six? — eight and nine? — eight and twelve? — eight and*

eleven? — eight and eight? — eight and five? — eight and two? — eight and one? — eight and four? — eight and seven? — eight and ten?

LESSON NINTH.



1. A girl who had nine pins, found three more; how many had she then?

Answer. She had twelve; because nine pins and three pins are twelve pins.

2. James and Lewis sit at one desk. James has nine books, and Lewis has four; how many books have the two? Nine and four are how many?

3. On one page of a spelling book are nine columns, and on the next page five; how many columns on the two pages? Nine and five are how many?

4. Helen is six years older than Jane. If Jane is nine years old, how old is Helen?

5. Frank studied nine hours one day, and seven hours the next; how many hours did he study in the two days?

6. On a peach tree are nine large peaches, and under the tree are eight more; how many peaches in all?

7. A cooper made nine flour barrels, and nine pork barrels, in one week; how many barrels did he make of both kinds? Nine and nine are how many?

8. A tinner in one day made nine large milk pans, and ten small ones; how many pans did he make in all?

9. A stove dealer sold eleven cook stoves, and nine parlor stoves in one week; how many stoves did he sell in all? *How many are eleven and nine? — nine and eleven?*

10. If a cow cost twelve dollars, and a hog nine dollars, how many dollars will it take to buy a cow and a hog? Twelve stars and nine stars are how many stars?

11. Alice paid nine cents for a comb, six cents for a yard of ribbon, and three cents for a stick of tape; how much money did she pay out?

12. Nine, and twelve, and five, are how many?

13. *How many* are four and nine? — eight and nine? — twelve and nine? — nine and three? — nine and seven? — nine and eleven? — two and nine? — six and nine? — eight and nine? — nine and one? — nine and five? — nine and nine?

LESSON TENTH.



1. There are ten inches and two inches in a foot; then how many inches make a foot?

2. A lad gave ten cents for a knife, and three cents for a ball; how many cents did he give for the two?

3. Under one counter of a store are ten kegs of nails, and under the other counter are four kegs; how many kegs of nails under both counters? Ten stars and four stars are how many stars?

4. In a shoe store are ten pairs of shoes on one shelf, and five pairs on another; how many pairs of shoes on the two shelves? Ten and five are how many?

5. In one family are six persons, and in another family ten; how many persons in the two families? *How many* are six and ten? — ten and six?

6. In one box are ten vials, and in another seven; how many vials in the two boxes?

7. In a stable are ten black horses, and eight gray ones; how many horses in the stable? *How many* are ten and eight? — eight and ten?

8. David has ten doves, and Edgar has nine; how many doves have they both together?

9. A man bought a cutter for ten dollars, and gave ten dollars to have it repaired and painted; how much did the cutter cost him? Ten and ten are how many?

10. *How many books* are ten books and eleven books? — ten books and twelve books? — eleven books and ten books? — twelve books and ten books?

11. Fanny paid ten shillings for a pair of shoes, seven shillings for a pair of gloves, and three shillings for a purse; how much did she give for the whole? Ten, and seven, and three, are how many?

12. How many yards are ten yards, and six yards, and four yards?

13. *How many are* ten and one? — ten and seven? — ten and two? — ten and eight? — ten and three? — ten and nine? — ten and four? — ten and ten? — ten and five? — ten and eleven? — ten and six? — ten and twelve?

LESSON ELEVENTH.



1. Ruth put eleven young ducks into a pen with two old ones; how many ducks were then in the pen?

2. Peter caught eleven fishes, and then caught three more; how many fishes had he then?

3. *How many quarts are* eleven quarts and four quarts? — five quarts and eleven quarts?

4. Mary bought eleven yards of blue ribbon, and six yards of pink ribbon; how many yards of ribbon did she buy? Eleven and six are how many?

5. Francis gave eleven dollars for a coat, and had seven dollars left; how many dollars had he at first? Eleven dollars and seven dollars are how many dollars?

6. There are eight acres of land in one field, and eleven acres in another; how many acres in the two fields? Eight and eleven are how many?

7. A farmer sowed eleven bushels of wheat, and had nine bushels left; how many bushels had he at first?

8. In a garden there are ten peach trees, and eleven cherry trees; how many trees of the two kinds? Eleven stars and ten stars are how many stars?

9. A weaver wove eleven yards of cloth one day, and

eleven yards the next; how many yards did he weave in the two days? Eleven and eleven are how many.

10. A grocer sold fifteen pounds of sugar for eleven shillings, and two pounds of tea for twelve shillings; how many shillings did he receive for the sugar and tea?

11. A cow gave eleven quarts of milk on Monday, nine quarts on Tuesday, and ten quarts on Wednesday; how many quarts of milk did she give in the three days? Eleven, and nine, and ten; are how many?

12. Thomas gave six cents to the Bible Society, George gave four cents, James eleven cents, and William three cents; how many cents did they all give?

13. *How many are eleven and twelve?* — eleven and six? — eleven and eleven? — eleven and five? — eleven and ten? — eleven and four? — eleven and nine? — eleven and three? — eleven and eight? — eleven and two? — eleven and seven? — eleven and one?

LESSON TWELFTH.

* * * * *

* * * * *

1. John was twelve years old two years ago; how old is he now?

Answer. He is fourteen; because twelve years and two years are fourteen years.

2. James was twelve years old three years ago; how old is he now? Twelve and three are how many?

3. Dick is now twelve years old; how old will he be four years from this time? How old will he be five years from this time? *How many are twelve and four?* — twelve and five?

4. Susan stuck twelve needles on a piece of cloth with six others; how many needles were then on the cloth?

5. In an orchard are twelve apple trees, and seven pear trees; how many trees in the orchard? Twelve stars and seven stars are how many stars?

6. There are eight potatoes in one hill, and twelve in

another; how many potatoes in the two hills? *How many are eight and twelve? — twelve and eight?*

7. A boy bought a sled for twelve cents, and gave nine cents to have some shoes put on it; how many cents did it cost him? *Twelve and nine are how many?*

8. A man bought an old chaise for twelve dollars, and sold it for ten dollars more than it cost him; how many dollars did he receive for it?

9. Edgar found twelve eggs in one nest, and eleven in another; how many eggs did he find?

10. A lady bought a bonnet and a shawl. For the bonnet she paid twelve dollars, and for the shawl twelve dollars more than for the bonnet; how much did she pay for the shawl? *Twelve and twelve are how many?*

11. Oscar has three picture books. In the first book there are seven pictures, in the second book ten, and in the third book twelve; how many pictures in the three books?

12. *How many are twelve and six? — twelve and seven? — twelve and five? — twelve and eight? — twelve and four? — twelve and nine? — twelve and three? — twelve and ten? — twelve and two? — twelve and eleven? — twelve and one? — twelve and twelve?*

LESSON THIRTEENTH.

1. Before a wagon are two gray horses, and one brown horse; how many horses before the wagon?

2. On a shelf are three silk hats, and two fur hats; how many hats on the shelf?

3. A boy found three eggs in one nest, and four in another; how many eggs did he find?

4. In one week are seven days; how many days in one week and two days?

5. Robert bought a hat for four shillings, and some paper for two shillings; how many shillings did he pay out?

6. Sarah gave a five cent piece and four cents for a yard of ribbon; how many cents did the ribbon cost?

7. In one piece of cloth are nine yards, and in another piece six yards; how many yards in the two pieces?

8. In one foot are twelve inches; how many inches in one foot and five inches?

9. If it take seven yards to make a dress for Ann, six yards to make a dress for Ellen, and eight yards to make a dress for Jane, how many yards will it take to make each of them a dress?

10. Frank gave fifteen walnuts to one boy, eight to another, and had seven left; how many walnuts had he at first?

11. *How many are two and three?* — four and two?

12. *How many are three and two?* — two and four?

13. *How many are five and five?* — three and four?

14. *How many are eight and two?* — seven and four?

15. *How many are eight and four?* — nine and three?

16. *How many are three and nine?* — five and ten? — four and eight?

17. *How many are eleven and four?* — eleven and six? — twelve and three?

18. *How many are three and twelve?* — four and eleven? — six and eleven?

19. *How many are twelve and six?* — eleven and five? — fourteen and four?

20. *How many are nine and six?* — twelve and five? — eight, and three, and one?

21. *How many are seven, and six, and eight?* — six, and eight, and seven?

22. *How many are fifteen, and eight, and seven?* — nineteen; and four, and two?

23. *How many are twenty, and five, and nine?* — eleven, and three, and four?

24. *How many are three, and six, and twelve, and two?* — nine, and eight, and one, and five?

SUBTRACTION.

LESSON FIRST.

* * * * *

1. A boy, having two cents, lost one* of them; how many had he left?

Answer. He had one cent; because one cent from two cents leaves one cent. Or, because one cent and one cent are two cents.

2. A man who had three horses, sold two of them; how many had he left? Two from three *leaves how many?* One from three — ?

3. A man had four cows, and he sold one of them; how many cows had he then?

4. Harry had five marbles, and he lost one of them; how many had he left? One star from five stars leaves how many stars?

5. Thomas had six apples, and he gave his playmate one of them; how many had Thomas then? How many more had Thomas than his playmate? One from six *leaves how many?* One from five — ?

6. In one book are seven pictures, and in another one picture; how many more pictures in one book than in the other? One star from seven stars leaves how many stars?

7. Jane had eight cents, but she spent one of them for paper; how many cents had she then?

8. If you make nine marks on your slate, and then rub out one of them, how many will be left?

9. A farmer put ten cows into a pasture, but one of them jumped out; how many were left?

10. Susan gave eleven cents for a book, and one cent for a pencil; how much more did she give for the book than for the pencil?

11. John performed twelve examples in his arithmetic lesson, and William only one; how many more examples did John perform than William?

* See Note 3.

12. One from two *leaves how many?* One from seven —? One from four —? One from one —? One from eight —? One from three —? One from thirteen —? One from ten —? One from six —? One from eleven —? One from five —? One from nine —? One from twelve —?

LESSON SECOND.

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1. Mary had three peaches, and she gave her sister two of them; how many had she left?

Answer. She had one; because two from three leaves one. Or, because two and one are three.

2. There were five birds on a fence, but two of them have flown away; how many remain on the fence?

3. A man gave four dollars for a calf, and two dollars for a sheep; how much more did he give for the calf than for the sheep?

4. William had six rabbits, but two of them died; how many had he left? How many must you add to four to make six?

5. A pint of filberts costs seven cents, and a lemon two cents; how much more will it take to buy a pint of filberts than a lemon? Two stars and how many stars make seven stars?

6. Thomas is ten years old, and George is two; how much older is Thomas than George?

7. Charles had nine cents in his pocket, and on his way to school he lost two of them; how many had he left?

8. Two and how many make eight? Six from eight *leaves how many?* Two from eight —?

9. A boy, having eleven quarts of cherries, sold all but two quarts; how many did he sell? How many more did he sell than he had left? Two from eleven *leaves how many?* Two from nine —? Seven from nine —?

10. A peddler had twelve pairs of gloves, and he sold two pairs; how many pairs had he left? Ten stars and how many stars make twelve stars?

11. Jane is thirteen years old, and Helen is two years younger; how old is Helen?

12. Robert had two cents, and his brother gave him enough to make his number fourteen; how many cents did his brother give him?

13. Two from two *leaves how many?* Two from three —? Two from eight —? Eight from ten —? Two from five —? Three from five —?

14. *How many must be added to two to make four? — to make six? — to make seven? — to make twelve? —*

LESSON THIRD.

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1. Harry had four ducks, but one of them died; how many had he left? One from four *leaves how many?* Three from four —?

2. Lewis gave five cents for a copy-book, and three cents for a pen; how much more did he give for the book than for the pen? How much for both? Five and three are how many? Three from eight *leaves how many?* Five from eight —?

3. Hannah had six roses, and she gave her teacher three of them; how many had she left? How many more had she than her teacher?

4. A silversmith has seven thimbles; if he sells three of them, how many will he have left? Four stars and how many stars make seven stars?

5. In an arithmetic class were nine scholars, and three of them had imperfect lessons; how many had perfect lessons?

6. Daniel husked ten bushels of corn, and his little brother, William, husked three bushels; how much more did Daniel husk than William?

7. A man paid eleven dollars for a coat, and three dollars for a vest; how much more did he give for the coat than for the vest?

8. A boy bought a sled for thirteen cents, and sold it for ten cents; how much did he lose?

9. Three stars and how many stars make twelve stars? Nine stars from twelve stars *leaves how many stars?* Three stars from nine stars —?

10. Ruth found thirteen eggs in a nest, and three of them were broken; how many were unbroken? Three from thirteen leaves how many?

11. A merchant has a piece of broadcloth containing fourteen yards; if he sells three yards, how many yards will he have left?

12. *Three and how many make five? — four? — seven? — twelve? — fourteen? — nine? — six?*

LESSON FOURTH.

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1. Oscar had six quarts of cherries, and sold four quarts to the rail-car passengers; how many quarts had he left?

Answer. He had two quarts; because four quarts from six quarts leaves two quarts. Or, because two quarts and four quarts are six quarts.

2. Eliza had seven shillings, but she spent four shillings for a pair of gloves; how many shillings has she left? Three and how many make seven?

3. A man had twenty-two acres of land in one field, and four acres in another; how much more land in one field than in the other?

4. A farmer sowed ten bushels of wheat, and four bushels of barley; how much more wheat than barley did he sow?

5. A teamster being eight miles from home, drove four miles of the distance in one hour; how much farther had he to drive?

6. There were five chairs in a room, but four of them have been carried out; how many remain in the room?

7. A man earned nine dollars in one week, and spent

four dollars of it for a pair of boots; how many dollars had he left? Five from nine leaves how many?

8. There are thirteen verses in William's Sabbath school lesson, and he has learned four of them; how many has he yet to learn? Four stars from thirteen stars leaves how many stars?

9. A man bought fifteen yards of cloth, and sold a neighbor four yards of it; how many yards had he left? How much more had he than his neighbor then? Four from fifteen leaves how many? Seven and how many make eleven? Four from eleven leaves how many?

10. George, having twenty apples, gave four to James; how many had he left? He afterwards gave four to John; how many had he then?

11. Four from fifteen *leaves how many?* Four from seventeen —? Four from twenty-five —? Four from eleven —? Four from eighteen —? Four from four —? Four from twenty-one —? Four from twenty-seven —?

LESSON FIFTH.

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1. In Ellen's copy-book are six sheets of paper, and in Ann's five; how many more sheets in Ellen's copy-book than in Ann's?

2. Charles had ten figs given him, and he gave five to his little brother; how many had he left?

3. George has seven merit marks, and William has five; how many more must William get, to have as many as George?

4. A teamster's bill at a hotel, for himself and team, was nine shillings; his own expenses were five shillings; what were the expenses of the team?

5. Caroline put eight pins into a cushion, and then took out three of them; how many remained in the cushion? Five from eight leaves how many?

6. If a quart of chestnuts cost eleven cents, and a quart

of walnuts five cents, what is the difference in their prices?

7. A man carried thirteen geese to market, but could sell only five of them; how many did he carry home? Five stars and how many stars make thirteen stars?

8. Emily found fourteen roses on her rose bush, and picked five of them to take to school; how many roses were left on the bush?

9. A man bought twelve bushels of apples, of which five bushels were sweet, and the rest sour; how many bushels were sour? Seven from twelve *leaves how many?* Five from twelve —?

10. On a table are sixteen books; if I take off five, how many will be left on the table?

11. *What number added to five will make fifteen? — nineteen? — twenty-four? — twenty-nine? — thirty-two?*

LESSON SIXTH.*

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1. A man bought eight pounds of butter, and his family used all but six pounds of it in one week; how much did they use?

Answer. They used the difference between six pounds and eight pounds; six pounds from eight pounds leaves two pounds. Therefore, they used two pounds.

2. Frank had seven walnuts, and he gave away six of them; how many had he left?

3. Emma bought nine yards of ribbon, six yards of which were blue, and the rest red; how many yards were red? Six from nine *leaves how many?*

4. A hardware merchant bought twelve stoves, and sold six of them in one month; how many had he left?

5. I traded my ball worth six cents, for a slate worth

* See Note 4.

eleven cents, and paid the balance in money; how much money did I pay? Six and how many make eleven?

6. Bought a pound of sugar for ten cents, for which I gave one dozen of eggs worth six cents, and the rest in money; how much money did I pay?

7. A miller had thirteen barrels of flour, and sold all but six of them; how many barrels did he sell?

8. A merchant tailor has sixteen coats; if he sells six of them, how many will he have left?

9. In an orchard there are fourteen trees; six of them bear cherries, and the rest peaches; how many bear peaches?

Answer. As many as the difference between six trees and fourteen trees; six trees from fourteen trees leaves eight trees. Therefore, eight trees bear peaches.

10. Lewis had seventeen apples, and he sold six of them; how many had he left? Six from seventeen leaves how many?

11. In a flock of fifteen sheep, six of them are black, and the rest white; how many are white?

12. A lady paid eighteen dollars for a shawl, and six dollars for a dress; how much more did she give for the shawl than for the dress?

13. What number with six will make fifteen? — fourteen? — twelve? — twenty-two? — thirty?

LESSON SEVENTH.

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1. In the first reading class there are eight scholars, and in the second reading class seven; how many more in the first class than in the second?

2. In a certain family there are nine children, seven of which are boys; how many girls in the family?

3. A teamster bought ten bushels of oats, and fed seven bushels of them to his team in one week; how many bushels had he left? Seven from ten leaves how many?

4. William gave seven quills for a ball, and seven for a ball club; how many more did he give for the ball than for the club?

5. Byron had fourteen rabbits, and he sold seven of them to his cousin, Horace; how many had Byron then?

6. A cooper made sixteen barrels, and sold seven of them; how many had he left?

7. Harry dug twelve bushels of potatoes in one day, and James dug seven bushels; how many bushels more did Harry dig than James?

8. On the shelf are thirteen plates; seven of them are large ones, and the rest are small; how many small plates are there?

9. Mary is seventeen years old, and Harriet is seven years younger; how old is Harriet?

10. If a barrel of flour costs seven dollars, and a barrel of pork fifteen dollars, how much more will a barrel of pork cost than a barrel of flour?

11. A tinner has eighteen large milk pans; if he sells seven of them, how many will he have left? Seven from eighteen *leaves how many?* Eleven from eighteen —?

12. A peddler sold seven yards of tape from a piece containing nineteen yards; how many yards were left in the piece? Seven from nineteen *leaves how many?*

13. Seven from twelve *leaves how many?* Seven from seventeen —? Seven from twenty-two —? Seven from twenty-seven —? Seven from thirty-two —? Seven from thirty-seven —? Seven from forty-two —?

LESSON EIGHTH.

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1. A lad gave eleven cents for a knife, and eight cents for a ball; what was the difference in their prices?

2. Bought a harness for eight dollars, and sold it for nine dollars; did I gain or lose, and how much?

Answer. I gained the difference between eight dollars
\$*

and nine dollars, which is one dollar. Therefore, I gained one dollar.

3. In a keg were ten gallons of molasses, but eight gallons have been drawn out; how many gallons remain in the keg?

4. Bought a hog for twelve dollars, and a sheep for eight dollars less than the cost of the hog; what did I pay for the sheep?

5. Ellen's geography lesson contained fourteen questions, and she recited eight of them; how many did she miss? Eight stars from fourteen stars leaves how many stars?

6. Sarah had thirteen cents, but she has spent eight of them; how many has she left?

7. A man who was seventeen miles from home, traveled towards home eight miles in two hours; how far from home was he then?

8. A farmer had fifteen hogs; he killed eight of them in the fall, and kept the rest till spring; how many did he winter? Eight from fifteen leaves how many? Seven from fifteen — ?

9. A lady bought sixteen yards of gingham for her two daughters, Emma and Fanny, each a dress; in Emma's dress were eight yards, and in Fanny's dress the rest; how many yards in Fanny's dress? In which dress was there the most?

10. A man bought a harness and a saddle; for the harness he gave eighteen dollars, and for the saddle eight dollars; for which did he give the most, and how much?

11. James had twenty cents, and gave eight of them for a spelling-book; how many cents had he left?

12. *Eight and how many make nineteen?* — fifteen?
— twenty-two? — twelve? — seventeen? — thirty?
— thirty-five? — forty-two? — fifty?

LESSON NINTH.

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1. Levi gave ten cents for a top, and sold it for nine cents; how much did he lose?

2. A grocer, having eleven chests of tea, sold nine chests; how many had he left?

3. Henry had twelve quills, and gave nine of them for three sheets of paper; how many quills had he left? Three from twelve *leaves how many?* Nine from twelve—?

4. Jacob, having fifteen doves, wishes to keep nine of them, and sell the rest; how many can he sell?

5. A man bought a cow for sixteen dollars, and a load of hay for nine dollars; how much more did he give for the cow than for the hay?

6. A dairy woman carried thirteen pounds of butter to market; she sold nine pounds of it to an innkeeper, and the rest to a grocer; how many pounds did she sell to the grocer?

7. A man sold a load of hay for fourteen dollars, and received in payment a barrel of beef worth nine dollars, and the rest in money; how much money did he receive?

8. Samuel is seventeen years old; how old was he nine years ago? Nine from seventeen *leaves how many?* Eight from seventeen—?

9. Albert's father gave him nine cents, and his mother gave him enough to make his number nineteen; how many cents did his mother give him?

10. William had eighteen peaches; he gave nine to his brother, and the remainder to his sister; how many did he give his sister?

11. A man sold a cow for nineteen dollars, and took nine dollars in cloth, and the rest in money; how much money did he receive?

12. A man bought a wagon for twenty dollars, and sold it for nine dollars less than cost; how much did he get for it?

13. Nine from twelve *leaves how many?* Nine from sixteen — ? Nine from twenty — ? Nine from thirteen — ? Nine from twenty-nine — ?

14. *Nine and how many makes seventeen?* — twenty-four? — fifteen? — thirty-two? — fifty?

LESSON TENTH.

1. A miller put into a bin eleven bushels of wheat; he took out at one time six bushels, and at another time three bushels; how much remained in the bin?

Answer. He took out six bushels and three bushels, which make nine bushels; then, there remained in the bin the difference between nine bushels and eleven bushels, which is two bushels. Therefore, two bushels remained in the bin.

2. Frank, having twelve walnuts, gave to one boy four, to another three, and to another two; how many had he left? Three, and four, and two, and how many make twelve?

3. Sarah, having thirteen cents, gave five cents for a stick of tape, and five cents for a yard of ribbon; how much money had she left?

4. If you had fourteen apples, and should give away ten of them, how many would you have left?

5. Ten, and four, and how many make fifteen? Seven, and five, and how many make eighteen? One, and four, and three, and five, and how many make nineteen? What number with three, and seven, and two, will make twenty?

6. John bought a sled for sixteen cents; he paid ten cents down, and got trusted for the balance; how many cents did he owe?

7. Ann had seventeen plums, and gave her sister ten of them; how many had she left? Which had the greater number, Ann or her sister? How much?

8. A man, having nineteen cords of wood, sold seven cords to one man, and three to another; how many cords had he left?

9. George had twenty marbles; he lost four of them at play, and then sold six; how many had he left?

10. Thomas, having twenty-one apples, gave three to one of his playmates, two to another, and five to another; how many had he left?

11. A merchant bought three barrels of flour for twenty-two dollars, but finding it damaged, he sold it for ten dollars less than he gave for it; how much did he get for it?

12. Nine from twelve *leaves how many*? Six from sixteen —? Ten from sixteen —? Two and three from nine —? Four and seven from eighteen —? Six and three and one from twenty —?

LESSON ELEVENTH.

1. A man bought a cow for eleven dollars, and sold her for thirteen dollars; how much did he make by the bargain?

2. James had fourteen peaches; he gave four to John, and seven to Thomas; how many had he left?

3. A merchant, having twelve yards of cloth in one piece, sold three yards of it to one person, and seven yards to another; how many yards were left in the piece?

4. In one field are nineteen acres of land, and in another eleven acres; how much more land in one field than in the other?

5. Peter caught twenty fishes, and on his way home sold five of them to one man, and six to another; how many had he left?

6. A painter bought twenty-one gallons of oil, and having used a quantity of it, found he had eleven gallons left; how much had he used?

7. If I have twenty-four cents, and give two to Charles, three to James, four to Susan, and two to Harriet, how many will I have left?

8. A farmer has twenty-two sheep, and eleven lambs; how many more sheep than lambs had he?

9. A man, owing twenty-five dollars, paid eleven dollars; how much did he then owe?

10. Three, and fifteen, and how many make twenty? Twelve, and eight, and how many make thirty? Twenty-five, and three, and two, and how many make forty?

11. Nine from ten *leaves how many*? Eight from twenty—? Two from thirty—? Six from forty—?

12. Five and three from twenty *leaves how many*? Four and four from thirty—? Six and two from fifty—?

13. Four and five from thirty *leaves how many*? Eight and one from sixty—? Seven and two from twenty—? Six and three from fifty—? Five and four from forty—?

14. Six and how many make fourteen? — twenty-four? — thirty-four? — fifty-four? — sixty-four?

LESSON TWELFTH.

1. Horace, having thirteen cents, spent four cents for an orange, five cents for a pint of chestnuts, and three cents for an ounce of candy; how many cents did he spend? How many had he left?

2. Laura is fifteen years old, and Hannah is eleven; what is the difference in their ages?

3. Charles had fifteen cents, but he has paid out twelve cents for a book; how many cents has he left?

4. One clerk receives sixteen dollars a month, and another receives twelve; what is the difference in their wages?

5. A lady bought a muff for seventeen dollars, and gave the merchant two ten dollar bills; how many dollars must she receive in change?

6. Jane, having eighteen cents, gave five cents for a stick of tape, three cents for a yard of pink ribbon, four cents for a paper of pins, and the rest of her money for two lemons; what did the lemons cost?

7. A lady, having nineteen dollars in her purse, went out to make some purchases; she paid seven dollars for a dress, two dollars for sixteen yards of muslin, and three dollars for four yards of linen; how much money had she left?

8. A cabinet maker asks twenty-two dollars for a bureau, and twelve dollars for a table; how much does the price of the bureau exceed the price of the table?

9. In an orchard are twenty trees, seven of which are plum trees, five pear trees, and the remainder apple trees; how many are apple trees?

10. A wholesale grocer, having twenty-three chests of tea, sold to one retail grocer two chests, to another six chests, and to another four chests; how many chests did he sell? How many had he left?

11. Henrietta bought a slate for nine cents, a sponge for three cents, and had nine cents left; how many cents had she at first?

12. Four and five and three and how many make thirteen? Eleven from fifteen *leaves how many*? Twelve from twenty-five —? Five and three and four and six from twenty —? Seven and two and three from nineteen?

13. Ten from sixteen *leaves how many*? Ten from fifty-six —? Ten from thirty-six —? Ten from eighty-six —? Ten from sixty-six —?

MULTIPLICATION.

LESSON FIRST.

1. What will two bushels of wheat cost, at one dollar a bushel?

Answer. Since one bushel costs one dollar, two bushels will cost two times one dollar, which are two dollars. Therefore, two bushels of wheat will cost two dollars.

2. Charles bought three apples, for one cent apiece; how much did they cost him?

3. How many shillings will John earn in four days, at one shilling a day?

4. What will eight yards of ribbon cost, at one cent a yard?

5. How much will five pencils cost, at one cent apiece?

6. What will nine pears cost, at one cent apiece?

7. James bought six marbles, at one cent apiece; what did he pay for them?

8. Ann bought ten figs, at one cent apiece; how much did she pay for them?

9. A cooper made one barrel each day; how many barrels did he make in twelve days?

10. At one dollar a yard, what will eleven yards of satin cost?

11. Mr. Smith can plant one acre of corn in one day; how many acres can he plant in seven days?

12. A merchant burned one cord of wood in one month; how many cords of wood would last him three months? — eight months?

13. How many are five times one? — three times one? — two times one? — eight times one? — six times one? — nine times one? — four times one? — ten times one? — seven times one? — eleven times one? — twelve times one?

LESSON SECOND.*

Two times one are two.

" " two " four.

" " three " six.

" " four " eight.

" " five " ten.

" " six " twelve.

Two times seven are fourteen.

" " eight " sixteen.

" " nine " eighteen.

" " ten " twenty.

" " eleven " twenty-two.

" " twelve " twenty-four.

1. What will two yards of ribbon cost, at two cents a yard?

Answer. Since one yard costs two cents, two yards will cost two times two cents, which are four cents. Therefore, two yards of ribbon, at two cents a yard, will cost four cents.

2. What will two quarts of plums cost, at four cents a quart? How many are two times four? — four times two?

3. If a man walks six miles an hour, how far will he walk in two hours?

Answer. If a man walks six miles in one hour, in two

* See Note 5.

hours he will walk two times six miles, which are twelve miles. Therefore, in two hours he will walk twelve miles.

4. Margaret bought three lemons, at two cents apiece; how much did she pay for them?

5. At two dollars a bushel, what will be the cost of five bushels of peaches?

6. There are seven days in one week; how many days in two weeks? *How many are seven times two? — two times seven?*

7. A potter made seven jugs, each of which would hold two quarts; how many quarts would they all hold?

8. What will nine yards of velvet cost, at two dollars a yard? What will ten yards cost? Eleven yards?

9. What cost eleven pairs of shoes, at two dollars a pair? *What cost eight pairs? — five pairs?*

10. If twelve yards of silk will make one dress, how many yards will make two dresses?

11. *If a carpenter can earn two dollars in one day, how much can he earn in six days? — in four days? — in ten days? — in twelve days? — in two days?*

12. *How many are six times two? — nine times two? — twelve times two? — two times two? — five times two? — eight times two? — eleven times two? — seven times two? — four times two? — ten times two?*

13. *How many are two times six? — two times nine? — two times twelve? — two times five? — two times eight? — two times eleven? — two times seven? — two times four? — two times ten?*

LESSON THIRD.

Three times one	are three.
" " two	" six.
" " three	" nine.
" " four	" twelve.
" " five	" fifteen.
" " six	" eighteen.

Three times seven	are twenty-one.
" " eight	" twenty-four.
" " nine	" twenty-seven.
" " ten	" thirty.
" " eleven	" thirty-three.
" " twelve	" thirty-six.

1. How much will two quarters' tuition come to, at three dollars a quarter?

2. *What will be the cost of three sheep, at one dollar apiece? — at two dollars apiece?*

3. Charles, having three classmates, gave them three peaches each; how many peaches did they all receive?

4. At six cents a pound, how much will three pounds of chalk cost?

5. In one pint there are four gills; how many gills in three pints?

6. How much will five cords of wood cost, at three dollars a cord?

7. What will be the cost of three bushels of clover seed, at eight dollars a bushel?

8. If a cow give seven quarts of milk in one day, how many quarts will she give in three days?

9. *What will three pounds of cheese cost*, at eight cents a pound? — at six cents a pound?

10. A farmer gave three bushels of corn for one yard of cloth; how many bushels must he give for nine yards? *How many bushels* for eleven yards? — for eight yards?

11. How much must I pay for ten quarts of cherries, at three cents a quart? How much for six quarts?

12. At twelve dollars a barrel, what will three barrels of beef come to?

13. *How many are* two times three? — three times one? — three times three? — six times three?

14. *How many are* four times three? — five times three? — three times eight? — seven times three? — three times seven? — nine times three? — eleven times three?

15. *What is the difference* between three times ten and ten times three? — between three times six and six times three?

LESSON FOURTH.

Four times one are four.

" " two " eight.

" " three " twelve.

" " four " sixteen.

" " five " twenty.

" " six " twenty-four.

Four times seven are twenty-eight.

" " eight " thirty-two.

" " nine " thirty-six.

" " ten " forty.

" " eleven " forty-four.

" " twelve " forty-eight.

1. How much will four sheep cost, at two dollars apiece?

- ## LESSON FIFTH.

Five times seven are thirty-five.
 " " eight " forty.
 " " nine " forty-five.
 " " ten " fifty.
 " " eleven " fifty-five.
 " " twelve " sixty.

1. Harry gave four apples for one pear; how many apples could he get for five pears, at this rate?
2. How much will five quarts of plums come to, at two cents a quart?
3. How much must be paid for five pounds of pork, at five cents a pound?
4. What cost six fur hats, at five dollars apiece?
5. How far can a man travel in three hours, at the rate of five miles an hour?
6. How much are five bunches of shingles worth, at four dollars a bunch?
7. If a weaver can weave seven yards of carpeting in one day, *how many yards can he weave* in five days? — in three days? — in two days? — in four days?
8. William gathered eight quarts of chestnuts each day, for six days; how many quarts did he gather in all?
9. How much will five acres of land come to, at twelve dollars an acre?
10. *What cost five firkins of butter*, at ten dollars a firkin? — at eleven dollars a firkin?
11. *How many are five times one?* — five times two? — five times five? — five times six? — five times three? — five times four? — five times seven? — five times eight? — five times twelve? — five times eleven? — five times ten?

LESSON SIXTH.

Six times one	are six.	Six times seven	are forty-two.
" " two	" twelve.	" " eight	" forty-eight.
" " three	" eighteen.	" " nine	" fifty-four.
" " four	" twenty-four.	" " ten	" sixty.
" " five	" thirty.	" " eleven	" sixty-six.
" " six	" thirty-six.	" " twelve	" seventy-two.

1. In one quart are two pints; how many pints in six quarts?
2. In one yard are three feet; *how many feet* in six yards? — in four yards? — in two yards?
3. If a dove can fly one mile in a minute, how many miles can it fly in six minutes?
4. *What is the cost of six inkstands*, at five cents apiece? — at four cents apiece?

5. A farmer sold six tons of hay, at six dollars a ton ; how many dollars did he receive ?

6. A peddler sold four pictures, at six cents each ; how many cents did he get for them ?

7. If a horse travels seven miles in one hour, how many miles can he travel in six hours ?

8. How much will nine pairs of boots come to, at six dollars a pair ?

9. Rufus worked six months, at eight dollars a month ; what was the amount of his wages ?

10. A grocer bought six quarts of strawberries, at eleven cents a quart ; how much did he give for them ?

11. A teacher bought ten primers, at six cents apiece ; how much did they come to ?

12. In one foot are twelve inches ; *how many inches* in six feet ? — in three feet ? — in five feet ?

13. *How many are* six times two ? — six times three ? — six times one ? — six times five ? — six times four ? — six times six ? — six times nine ?

14. *How many are* seven times six ? — nine times six ? — eight times six ? — eleven times six ? — ten times six ? — twelve times six ? — five times six ?

LESSON SEVENTH.

Seven times one	are seven.	Seven times seven	are forty-nine.
" " two	" fourteen.	" " eight	" fifty-six.
" " three	" twenty-one.	" " nine	" sixty-three.
" " four	" twenty-eight	" " ten	" seventy.
" " five	" thirty-five.	" " eleven	" seventy-seven.
" " six	" forty-two.	" " twelve	" eighty-four.

1. How much will it cost to take a newspaper seven years, at one dollar a year ?

2. At two dollars a week, how much will seven weeks' board come to ? Seven times two are how many ?

3. If five men can do a piece of work in seven days, how many days will it take one man to do it ?

4. How much will three quarts of blackberries cost, at seven cents a quart ? How much will five quarts cost ?

5. At seven cents a pound, how much will four pounds of pepper cost ?

6. Bought seven pounds of veal, at six cents a pound; how many cents did I pay for it?

7. *How many days* in eight weeks? — in four weeks? — in two weeks? — in five weeks?

8. A miller can pack seven barrels of flour in one hour; *how many barrels* can he pack in seven hours? — in eight hours?

9. A merchant bought nine cloke patterns, each containing seven yards; how many yards in all?

10. How much will ten pounds of cheese come to, at seven cents a pound?

11. *What will twelve pounds of sugar cost*, at seven cents a pound? — at six cents a pound?

12. If the interest of one dollar for one year is seven cents, *what is the interest* of eleven dollars for the same time? — of five dollars? — of twelve dollars?

13. Seven times one *are how many*? Seven times five —? Seven times seven —? Seven times eleven —? Seven times nine —? Seven times twelve —?

14. Two times seven *are how many*? Three times seven —? Six times seven —? Four times seven —? Eight times seven —? Seven times ten —?

LESSON EIGHTH.

Eight times one are eight.

"	"	two	"	sixteen.
"	"	three	"	twenty-four.
"	"	four	"	thirty-two.
"	"	five	"	forty.
"	"	six	"	forty-eight.

Eight times seven are fifty-six.

"	"	eight	"	sixty-four.
"	"	nine	"	seventy-two.
"	"	ten	"	eighty.
"	"	eleven	"	eighty-eight.
"	"	twelve	"	ninety-six.

1. How much will eight bushels of plums come to, at one dollar a bushel?

2. In one peck are eight quarts; how many quarts in two pecks?

3. If one quart of milk costs six cents, what will eight quarts cost?

4. How much will eight cords of wood come to, at five dollars a cord?

5. What will be the cost of seven barrels of beef, at eight dollars a barrel?

6. Sarah bought three yards of edging, at eight cents a yard; how much did she pay for it?

7. How much will four pounds of raisins come to, at eight cents a pound?

8. How far will a stage coach go in ten hours, at the rate of eight miles an hour?

9. At eight cents a yard, how much will eight yards of muslin cost? *How much will five yards? — three yards?*

10. How many quarts in eleven pecks?

11. How much will eight pounds of coffee cost, at nine cents a pound?

12. A lady bought eight yards of calico, at twelve cents a yard; how much did she pay for it?

13. Eight times one *are how many?* Eight times two —? Eight times ten —? Eight times five —? Eight times eight —? Eight times three —? Eight times eleven —? Eight times nine —? Eight times twelve —?

14. *What is the difference between eight times six and six times eight? — eight times five and five times eight? — eight times three and three times eight?*

LESSON NINTH.

Nine times one	are nine.
" " two	" eighteen.
" " three	" twenty-seven.
" " four	" thirty-six.
" " five	" forty-five.
" " six	" fifty-four.
" " seven	" sixty-three.
" " eight	" seventy-two.
" " nine	" eighty-one.
" " ten	" ninety.
" " eleven	" ninety-nine.
" " twelve	" one hundred and eight.

1. If it takes nine yards of calico to make one dress, how many yards will it take to make four dresses?

2. In the first reading class are nine scholars, and in the second two times as many; how many scholars in the second class?

3. At nine cents a pound, how much will three pounds of lard cost? How much will two pounds?

4. A merchant sold nine pounds of sugar to one man,

and five times as much to another; how many pounds did he sell to the second man? How many pounds in all?

5. *How much will nine pairs of shoes cost*, at one dollar a pair? — at three dollars a pair? — at two dollars a pair?

6. What will be the cost of nine tea plates, at eight cents apiece?

7. If it takes four bushels of wheat to make a barrel of flour, *how many bushels will it take* to make nine barrels? — to make four barrels? — to make seven barrels?

8. Thomas has seven picture-books, in each of which are nine pictures; how many pictures in all the books?

9. If a bushel of lime is worth nine cents, *how much are* nine bushels worth? — six bushels? — three bushels?

10. How much will nine pounds of sewing silk come to, at six dollars a pound?

11. Henry sold ten quarts of strawberries, at nine cents a quart; how much did he get for them?

12. A drover bought nine cows, paying for them eleven dollars apiece; how much did they all cost him?

13. How much can a man earn in nine months, at twelve dollars a month?

14. Nine times *four are how many?* Nine times three —? Nine times one —? Nine times nine —? Nine times ten —? Ten times nine —?

15. Two times nine *are how many?* Five times nine —? Eight times nine —? Seven times nine —? Six times nine —? Eleven times nine —? Twelve times nine —? Nine times twelve —?

LESSON TENTH.

Ten times one	are ten.
" " two	" twenty.
" " three	" thirty.
" " four	" forty.
" " five	" fifty.
" " six	" sixty.
" " seven	" seventy.
" " eight	" eighty.
" " nine	" ninety.
" " ten	" one hundred.
" " eleven	" one hundred and ten.
" " twelve	" one hundred and twenty.

1. In one gallon are four quarts; how many quarts in ten gallons?
2. In one quart are two pints; how many pints in ten quarts?
3. In one yard are three feet; *how many feet* in ten yards? — in five yards? — in seven yards?
4. In Canada five shillings make one dollar; how many Canada shillings in ten dollars?
5. In New England six shillings make one dollar; how many New England shillings in ten dollars?
6. In New York eight shillings make one dollar; how many New York shillings in ten dollars?
7. How many days in ten weeks?
8. In one year are twelve months; *how many months* in ten years? — in four years? — in three years?
9. A lumber man sawed a log, which made ten boards, each eleven feet long; what was the length of all the boards?
10. What is the cost of ten acres of land, at ten dollars an acre?
11. What is the cost of ten tons of hay, at nine dollars a ton?
12. In one cent are ten mills; *how many mills* in three cents? — in eight cents? — in two cents? — in nine cents? — in six cents? — in eleven cents? — in four cents? — in five cents? — in seven cents? — in ten cents? — in twelve cents?
13. Ten cents make one dime, or ten cent piece; *how many cents* in two dimes? — in four dimes? — in six dimes? — in eight dimes? — in ten dimes? — in twelve dimes? — in eleven dimes? — in nine dimes?
14. Ten dimes make one dollar; *how many dimes* in three dollars? — in six dollars? — in nine dollars? — in eleven dollars? — in eight dollars? — in five dollars? How many cents in one dollar?

LESSON ELEVENTH.

Eleven times one	are eleven.
" " two	" twenty-two.
" " three	" thirty-three.
" " four	" forty-four.
" " five	" fifty-five.
" " six	" sixty-six.
" " seven	" seventy-seven.
" " eight	" eighty-eight.
" " nine	" ninety-nine.
" " ten	" one hundred and ten.
" " eleven	" one hundred and twenty-one.
" " twelve	" one hundred and thirty-two.

1. If a man can travel five miles in one hour, how many miles can he travel in eleven hours?

2. How much will eleven cloth caps come to, at two dollars apiece?

3. Six men bought a horse, for which they paid eleven dollars apiece; what was the cost of the horse?

4. At seven cents a pound, how much will eleven pounds of rice cost?

5. How much will eleven quarts of cherries come to, at four cents a quart?

6. Bought eight pounds of coffee, at eleven cents a pound; how much did I pay for it?

7. If eleven cords of wood will last one family a year, *how many cords will last* eleven families the same time? — six-families? — two families?

8. *How much will eleven sets of chairs come to*, at nine dollars a set? — at five dollars a set?

9. What will be the cost of eleven geographies, at one dollar apiece?

10. *How much are eleven loads of lumber worth*, at ten dollars a load? — at seven dollars a load?

11. A man bought eleven pounds of beef, at three cents a pound; how much did he pay for it?

12. If a man earn eleven dollars in one week, how much can he earn in two weeks?

13. Five times eleven *are how many*? Two times eleven —? Eleven times six —? Seven times eleven —? Four times eleven —? Eleven times eight —?

14. Eleven times eleven *are how many?* Nine times eleven — ? Eleven times one — ? Ten times eleven — ? Three times eleven — ? Eleven times twelve — ?

LESSON TWELFTH.

Twelve times	one	are	twelve.
"	"	two	" twenty-four.
"	"	three	" thirty-six.
"	"	four	" forty-eight.
"	"	five	" sixty.
"	"	six	" seventy-two.
"	"	seven	" eighty-four.
"	"	eight	" ninety-six.
"	"	nine	" one hundred and eight.
"	"	ten	" one hundred and twenty.
"	"	eleven	" one hundred and thirty-two.
"	"	twelve	" one hundred and forty-four.

1. What will twelve bonnets come to, at seven dollars apiece ?
2. At three dollars apiece, how much are twelve brass clocks worth ?
3. How much are twelve plows worth, at six dollars apiece ?
4. Nine men can do a certain piece of work in twelve days ; how long will it take one man to do it ?
5. How much are twelve bushels of dried peaches worth, at four dollars a bushel ?
6. A man plowed two acres of land each day, for twelve days ; how many acres did he plow in all ?
7. A laborer can mow one acre of grass in one day ; how many acres can he mow in twelve days ?
8. If you can buy twelve filberts for one cent, how many can you buy for twelve cents ?
9. If it takes five knots of yarn to knit one pair of stockings, how many knots will it take to knit twelve pairs ?
10. At twelve cents a mile, how much must be paid for a horse and carriage to drive twelve miles ?
11. Ten ten-cent pieces make one dollar ; how many ten-cent pieces in twelve dollars ?
12. How much are twelve trunks worth, at eight dollars apiece ?

13. Twelve things make one dozen; *how many things* in five dozens? — in nine dozens? — in two dozens? — in seven dozens? — in eleven dozens? — in four dozens?

14. In six dozens of eggs, how many eggs?

15. In ten dozens of buttons, how many buttons?

16. In eight dozens of goose quills, how many quills?

17. Twelve dozens make one gross; how many things in one gross?

LESSON THIRTEENTH.

1. Nine men can do a certain piece of work in twelve days; how many days will it take one man to do it? How many men will it take to do it in one day?

2. *How much can a man earn in a year*, at twelve dollars a month? — at ten dollars a month?

3. A boy bought ten oranges; he kept seven of them, and sold the others for five cents apiece; how many oranges did he sell? How many cents did he receive?

4. Thomas bought eight quarts of strawberries, at seven cents a quart, and nine quarts of cherries, at six cents a quart; how much did he pay for the strawberries? How much for the cherries? Which cost the most? How much?

5. A farmer sold nine pounds of veal, at three cents a pound, and five pounds of butter, at ten cents a pound; how much did he receive for both?

6. A man bought five sheep, at two dollars apiece, and three cows, at twelve dollars apiece; how much did he pay for all?

7. Edwin bought three pencils, at one cent apiece, four primers, at six cents apiece, and a slate for ten cents; how much did he pay out?

8. Nine times twelve *are how many*? — twelve times nine? — twelve times twelve?

9. Which is the most, eight times seven, or nine times six? How much?

10. How many are nine times three, and five times ten?

11. How many are five times two, and three times twelve?

12. Three times one, four times six, and ten are how many?

13. A girl bought two lemons, at four cents apiece, three oranges, at four cents apiece, and three pears, at two cents apiece; how much did she pay out?

14. A lady bought seven yards of calico, at twelve cents a yard, a pair of cotton gloves for ten cents, two cards of hooks and eyes, at four cents a card, and three whalebones, at two cents apiece; how much did she trade?

15. A man bought a sofa for thirty dollars, for which he gave three barrels of flour, at six dollars a barrel, four sheep, at two dollars a head, and the rest in money; how much money did he pay?

16. *What will twelve yards of broadcloth come to, at five dollars a yard? — at three dollars a yard?*

17. A mason took a job of work for eighty dollars; he employed twelve men a week, and paid them six dollars each; how much did he receive for his own labor?

18. *Which is the most, twelve times six, or six times twelve? — five times six, or four times seven? — nine times eight, or seven times ten? — four times twelve, or six times eight?*

DIVISION.

LESSON FIRST.

1. How many yards of cloth can be bought for two dollars, at one dollar a yard?

Answer. Since one dollar will buy one yard, two dollars will buy as many yards as the number of times one dollar is contained in two dollars. One dollar is contained in two dollars two times; therefore, two dollars will buy two yards of cloth, at one dollar a yard. Or, as many times as one dollar is contained in two dollars, so many yards can be bought; one dollar is contained, &c., as before.

2. Harry got three merit marks at school, getting one each day; how many days ~~was~~ he in getting them?

3. How many days will it take John to earn four shillings, if he earns one shilling a day?

4. How many yards of ribbon can be bought for eight cents, at one cent a yard?

5. George paid out five cents for pencils, at one cent apiece; how many pencils did he buy?

6. How many apples can you buy for nine cents, at one cent apiece?

7. James paid six cents for some marbles, giving one cent apiece for them; how many marbles did he buy?

8. If one cent will buy one fig, how many figs will ten cents buy?

9. A cooper can make one flour barrel in one hour; how many hours will it take him to make twelve barrels?

10. At one dollar a yard, how many yards of satin can be bought for eleven dollars? How many yards can be bought for fifteen dollars?

11. A man can plant one acre of corn in one day; *how many days will it take him to plant seven acres? — to plant twelve acres? — to plant four acres?*

12. If one cord of wood will last a family one month, how many months will three cords last them?

13. *How many times is one contained in five? — in three? — in two? — in eight? — in six? — in nine? — in four? — in ten? — in seven? — in eleven? — in twelve?*

LESSON SECOND.*

Two in two once.

" " four two times.

" " six three times.

" " eight four times.

" " ten five times.

Two in twelve six times.

" " fourteen seven times.

" " sixteen eight times.

" " eighteen nine times.

" " twenty ten times.

1. How many lemons can be bought for six cents, at two cents apiece?

Answer. Since two cents will buy one lemon, six cents will buy as many lemons as the number of times two cents are contained in six cents. Two cents are contained in six

* See Note 6.

cents three times ; therefore, six cents will buy three lemons, at two cents apiece.

2. A man paid out ten dollars for sheep, at two dollars apiece ; how many sheep did he buy ?

3. How many peaches can you buy for four cents, at two cents apiece ?

4. Two pints make one quart ; how many quarts in fourteen pints ?

5. A man paid eighteen dollars for the use of a pair of horses and carriage, paying at the rate of two dollars a day ; how many days did he use them ?

6. How many bushels of potatoes can you buy for twenty-two shillings, at two shillings a bushel ?

7. James divided eight plums among his sisters, giving them two apiece ; how many sisters had he ?

8. How long will it take a canal boat to go twelve miles, at the rate of two miles an hour ?

9. A man bought a brass kettle for sixteen shillings, paying two shillings a pound for it ; how many pounds did it weigh ?

10. For how many weeks' tuition will twenty shillings pay, at two shillings a week ?

11. How many wool hats can I buy for twenty-four dollars, at two dollars apiece ?

12. *How many times is two contained in six ? — in ten ? — in four ? — in fourteen ? — in eighteen ? — in twenty-two ? — in eight ? — in twelve ? — in sixteen ? — in twenty ? — in twenty-four ?*

LESSON THIRD.

Three in three once.

" " six two times.

" " nine three times.

" " twelve four times.

" " fifteen five times.

Three in eighteen six times.

" " twenty-one seven times.

" " twenty-four eight times.

" " twenty-seven nine times.

" " thirty ten times.

1. A merchant sold three yards of cloth for nine dollars ; how much was that a yard ?

Answer. Since three yards cost nine dollars, one yard cost as many dollars as the number of times three is con-

tained in nine. Three is contained in nine three times; therefore, the cloth was three dollars a yard.

2. A man would divide twelve cents equally among three children; how many cents would he give to each child?

3. James sold three quarts of cherries for six cents; how much were they a quart?

4. A tailor received fifteen dollars for making three coats; how many dollars was that apiece?

5. Three boys found a purse containing twenty-four dollars, which they divided equally among them; how many dollars did each boy have?

6. Three boys bought thirty fishhooks; how many was that for each boy?

7. A brewer sold three barrels of beer for eighteen dollars; how much was it a barrel?

8. Alice performed thirty-six examples in three hours; how many was that an hour?

9. Susan sold three dozens of eggs for twenty-seven cents; how much were they a dozen?

10. A teamster received twenty-one shillings for drawing three loads of bricks; how many shillings was that for drawing one load?

11. There are thirty-three yards of cloth in three equal pieces; how many yards in each piece?

12. *How many times is three contained in nine? — in twelve? — in six? — in fifteen? — in twenty-four? — in thirty? — in eighteen? — in thirty-six? — in twenty-seven? — in twenty-one? — in thirty-three?*

LESSON FOURTH.

Four in four once.

" " eight two times.

" " twelve three times.

" " sixteen four times.

" " twenty five times.

Four in twenty-four six times.

" " twenty-eight seven times.

" " thirty-two eight times.

" " thirty-six nine times.

" " forty ten times.

1. A shoemaker made two pairs of shoes in eight hours; how long was he in making one pair?

2. A man traveled twenty miles in four hours; how many miles did he travel in one hour?

3. A cook used thirty-two pounds of lard in four weeks ; how many pounds was that a week ?

4. How many reams of paper can I buy for forty-eight dollars, at four dollars a ream ?

5. In four gallons are sixteen quarts ; how many quarts in one gallon ? How many gallons in twelve quarts ?

6. A farmer plowed twenty-four acres of land in four weeks ; how many acres was that in one week ?

7. Thirty-six girls are in four reading classes, each class containing an equal number ; how many girls in one class ?

8. A bookseller sold sixteen books to four persons, selling an equal number to each ; how many books did he sell to one person ?

9. Twenty-eight pupils in arithmetic were divided into four equal classes ; how many pupils in each class ?

10. A lady paid forty cents for four yards of calico ; how much was it a yard ?

11. How many bushels in forty-four pecks, there being four pecks in one bushel ?

12. *How many times is four contained in eight ? — in twenty ? — in thirty-two ? — in forty-eight ? — in sixteen ? — in twenty-four ? — in thirty-six ? — in twelve ? — in twenty-eight ? — in forty ? — in forty-four ? — in four ?*

LESSON FIFTH.

Five in five once.

" " ten two times.

" " fifteen three times.

" " twenty four times.

" " twenty-five five times.

Five in thirty six times.

" " thirty-five seven times.

" " forty eight times.

" " forty-five nine times.

" " fifty ten times.

1. A man paid fifty dollars for five cows ; how much were they apiece ?

2. If five sheets of paper will make one copy-book, how many copy-books can be made of thirty sheets of paper ?

3. Fanny paid five cents for ten slate pencils ; how many slate pencils did she get for one cent ?

4. Alfred had thirty-five ducks, which he sold for five dollars ; how many ducks was that for one dollar ?

5. A merchant paid fifty-five dollars for muffs, at five dollars apiece; how many muffs did he buy?

6. A saddler paid forty cents for five balls of saddler's thread; how much was that a ball?

7. How many hours will it take a woman to spin twenty knots of yarn, if she spins five knots an hour? *How many hours will it take her to spin thirty-five knots? — to spin ten knots?*

8. A weaver wove forty-five yards of carpeting in five days; how many yards was that a day?

9. When milk is five cents a quart, how many quarts can you buy for twenty-five cents?

10. If you have fifteen cents, how many tops can you buy at five cents apiece?

11. How many oranges at five cents apiece, can you buy for sixty cents?

12. *How many times is five contained in fifty? — in thirty? — in ten? — in thirty-five? — in fifty-five? — in forty? — in twenty? — in forty-five? — in twenty-five? — in fifteen? — in five? — in sixty?*

LESSON SIXTH.

Six in six once.

" " twelve two times.

" " eighteen three times.

" " twenty-four four times.

" " thirty five times.

Six in thirty-six six times.

" " forty-two seven times.

" " forty-eight eight times.

" " fifty-four nine times.

" " sixty ten times.

1. John bought six slate pencils, and paid six cents for them; how much were they apiece?

2. A man rode six miles in a stage-coach, and his fare was thirty cents; how much was that a mile?

3. How many pounds of tea, at six shillings a pound, can you buy for eighteen shillings?

4. At six cents a pound, how many pounds of raisins can I buy for twelve cents?

5. A man sold six hundred pounds of pork for twenty-four dollars; how much was that for one hundred pounds?

6. How long will it take you to read a Sabbath school library book, containing forty-eight pages, if you read six pages a day?

7. I bought six pieces of gingham, for which I paid sixty dollars; how much was that a piece?

8. When nails are six cents a pound, how many pounds can be bought for thirty cents?

9. A man sold a load of wheat for fifty-four dollars, and took his pay in plows at six dollars apiece; how many plows did he buy?

10. A cabinet-maker sold six tables for sixty-six dollars; how much did he get apiece for them?

11. A girl made forty-two palm-leaf hats in six weeks; how many was that a week?

12. A hardware merchant paid seventy-two dollars for twelve cook stoves; how much were they apiece?

13. *How many times is six contained in six? — in thirty? — in eighteen? — in twelve? — in twenty-four? — in forty-eight? — in sixty? — in sixty-six? — in forty-two? — in seventy-two?*

LESSON SEVENTH.

Seven in seven once.

" " fourteen two times.

" " twenty-one three times.

" " twenty-eight four times.

" " thirty-five five times.

Seven in forty-two six times.

" " forty-nine seven times.

" " fifty-six eight times.

" " sixty-three nine times.

" " seventy ten times.

1. A laborer received forty-two cents for six hours' work; how much was that an hour?

2. A clerk sold seven pounds of sugar for seventy cents; how much was the sugar a pound?

3. How many ounces of nutmegs can you buy for eighty-four cents, at seven cents an ounce?

4. A man paid fourteen cents for seven quarts of milk; how much was that a quart?

5. In a certain orchard there are forty-nine trees standing in rows, each row containing seven trees; how many rows of trees are there?

6. If seven dollars will buy one saddle, how many saddles will fourteen dollars buy?

7. Seven men built a barn for sixty-three dollars, and each man received an equal share of the money; how many dollars did one man receive?

8. Seven days make one week; *how many weeks* in twenty-eight days? — in forty-two days?

9. A hatter sold seven caps for thirty-five shillings; how much did he get apiece for them?

10. A man has fifty-six hours' work to do; how many days will it take him, if he work seven hours each day?

11. A man paid seventy-seven cents for seven pounds of rope; how much was that a pound?

12. *How many times is seven contained* in forty-two? — in seventy? — in eighty-four? — in fourteen? — in forty-nine? — in seven? — in sixty-three? — in twenty-eight? — in thirty-five? — in fifty-six? — in seventy-seven?

LESSON EIGHTH.

Eight in eight once.

" " sixteen two times.

" " twenty-four three times.

" " thirty-two four times.

" " forty five times.

Eight in forty-eight six times.

" " fifty-six seven times.

" " sixty-four eight times.

" " seventy-two nine times.

" " eighty ten times.

1. In New York eight shillings make one dollar; how many dollars in sixteen shillings?

2. A man paid forty New York shillings for a load of lime; how many dollars did the lime cost him?

3. A man gathered seventy-two bushels of apples from eight trees; how many bushels was that from one tree?

4. How many times can I dip eight quarts of water out of a kettle containing twenty-four quarts?

5. How many bushels of clover seed can be bought for thirty-two dollars, at eight dollars a bushel? How many bushels, at four dollars a bushel?

6. Eight men have fifty-six hours' work to perform; how many hours will it take them to do it, if they all work together?

7. Martha lives forty-eight rods from school; how many minutes will it take her to walk there, if she walks eight rods in one minute?

8. A tinner sold eight basins for eighty-eight cents; how much were they apiece?

9. A merchant sold eight coat patterns from a piece of

broadcloth, for sixty-four dollars; how much was that a pattern?

10. Theodore sold eight dozens of eggs for eighty cents; how much did he get a dozen for them?

11. A miller bought ninety-six dollars' worth of goods of a merchant, and agreed to pay him in flour, at eight dollars a barrel; how many barrels would it take?

12. *How many times is eight contained in sixteen? — in forty? — in seventy-two? — in twenty-four? — in thirty-two? — in fifty-six? — in forty-eight? — in eighty-eight? — in sixty-four? — in eighty? — in ninety-six?*

LESSON NINTH.

Nine in nine once.

" " eighteen two times.

" " twenty-seven three times.

" " thirty-six four times.

" " forty-five five times.

Nine in fifty-four six times.

" " sixty-three seven times.

" " seventy-two eight times.

" " eighty-one nine times.

" " ninety ten times.

1. Frank paid eighteen cents for nine lemons; how much were they apiece?

2. If you can buy a quart of strawberries for nine cents, how many quarts can you buy for thirty-six cents?

3. A man paid fifty-four cents for nine pounds of veal; how much was it a pound?

4. If slates cost nine cents apiece, how many can I buy for sixty-three cents? How many for twenty-seven cents?

5. At nine dollars a barrel, how many barrels of white fish can be bought for twenty-seven dollars? How many for forty-five dollars?

6. How many days will it take a man to perform forty-five hours' work, if he work nine hours each day?

7. A man paid seventy-two cents for a horse and carriage to ride nine miles; how much was that a mile?

8. A lady paid ninety shillings for nine yards of satin; how much was the satin a yard?

9. Julius went to the printer's trade, and received one hundred and eight dollars for his second year's labor; how

much was that a month, there being twelve months in a year?

10. A carpenter received eighty-one dollars for work, at nine dollars a week; how many weeks had he worked?

11. If nine yards will make a dress, *how many dresses can be made* from ninety-nine yards? — from seventy-two yards? — from forty-five yards?

12. *How many times is nine contained in* eighteen? — in thirty-six? — in fifty-four? — in sixty-three? — in twenty-seven? — in forty-five? — in seventy-two? — in ninety? — in one hundred and eight? — in eighty-one? — in nine? — in ninety-nine?

LESSON TENTH.

Ten in ten once.

" " twenty two times.

" " thirty three times.

" " forty four times.

" " fifty five times.

Ten in sixty six times.

" " seventy seven times.

" " eighty eight times.

" " ninety nine times.

" " one hundred ten times.

1. At ten dollars an acre, how many acres of land can be bought for twenty dollars?

2. At ten cents a pound, how many pounds of butter can be bought for fifty cents?

3. At ten cents a bushel, how many bushels of lime can be bought for seventy cents?

4. A man has an orchard, containing one hundred and ten trees, which stand in ten equal rows; how many trees in each row?

5. Ten mills make one cent; *how many cents* in fifty mills? — in thirty mills? — in ninety mills? — in sixty mills? — in one hundred mills?

6. A father divided sixty cents equally among his ten children; how many cents did he give to each child?

7. A man wishes to set out eighty plum trees in ten rows; how many must he put in a row?

8. If you divide one hundred and twenty dollars into ten equal parts, how many dollars will there be in each part?

9. Effie paid ninety cents for ten yards of ribbon; how much was that a yard?

10. Eliza bought ten yards of edging for one dollar, or one hundred cents; how much did she pay a yard?

11. Ten cents make one dime; *how many dimes* in twenty cents? — in fifty cents? — in eighty cents? — in forty cents? — in one hundred cents?

12. Ten dollars make one eagle; *how many eagles* in thirty dollars? — in ninety dollars? — in one hundred and twenty dollars? — in one hundred dollars?

LESSON ELEVENTH.

Eleven in eleven once.

" " twenty-two two times.

" " thirty-three three times.

" " forty-four four times.

" " fifty-five five times.

Eleven in sixty-six six times.

" " seventy-seven seven times.

" " eighty-eight eight times.

" " ninety-nine nine times.

" " one hundred and ten ten times.

1. If eleven apples be equally divided among eleven boys, how many will each boy have?

2. At eleven dollars a ton, how many tons of hay can be bought for twenty-two dollars?

3. A man purchased eleven books for thirty-three shillings; how much were they apiece?

4. A jeweller sold eleven finger rings for fifty-five dollars; how much were they apiece?

5. Eleven men bought eighty-eight bushels of apples, each man buying an equal number of bushels; how many bushels did one man have?

6. One hundred and ten bushels of wheat were raised on eleven acres of land; how many bushels was that to an acre?

7. A man traveled one hundred and thirty-two miles by steamboat in eleven hours; how many miles was that an hour?

8. A trunk-maker sold eleven trunks for ninety-nine dollars; how much were they apiece?

9. Albert performed one hundred and twenty-one examples in his arithmetic in eleven days; how many examples was that a day?

10. There are sixty-six chairs in eleven sets ; how many chairs in one set ?

11. Bought eleven skeins of silk for forty-four cents ; how much did I pay a skein for it ?

12. A grocer sold eleven pounds of cheese for seventy-seven cents ; how much was that a pound ?

13. *How many times is eleven contained in twenty-two ? — in thirty-three ? — in eleven ? — in fifty-five ? — in eighty-eight ? — in one hundred and ten ? — in one hundred and thirty-two ? — in ninety-nine ? — in one hundred and twenty-one ? — in sixty-six ? — in forty-four ? — in seventy-seven ?*

LESSON TWELFTH.

Twelve in twelve once.

- | | | |
|---|---|-----------------------------------|
| " | " | twenty-four two times. |
| " | " | thirty-six three times. |
| " | " | forty-eight four times. |
| " | " | sixty five times. |
| " | " | seventy-two six times. |
| " | " | eighty-four seven times. |
| " | " | ninety-six eight times. |
| " | " | one hundred and eight nine times. |
| " | " | one hundred and twenty ten times. |

1. Bought twelve skeins of cotton for twelve cents ; how much did I pay a skein ?

2. How many years in forty-eight months, there being twelve months in a year ?

3. Twelve pence make one shilling ; *how many shillings in twenty-four pence ? — in sixty pence ?*

4. Twelve inches make one foot ; *how many feet in sixty inches ? — in thirty-six inches ?*

5. Joseph paid seventy-two cents for pine-apples, at twelve cents apiece ; how many pine-apples did he buy ?

6. How many times twelve *make eighty-four ?* How many times seven — ? How many times twelve *make thirty-six ?* How many times three — ? How many times nine — ? How many times four — ?

7. A painter received ninety-six dollars for painting carriages, at twelve dollars apiece ; how many carriages had he painted ?

8. A market man sold twelve dozens of cucumbers for one hundred and eight cents; how much were they a dozen?

9. A lumber man cut a tree, one hundred and thirty-two feet long, into logs, each twelve feet long; how many logs did the tree make?

10. Twelve eggs make one dozen; *how many dozens* in one hundred and twenty eggs? — in eighty-four eggs?

11. At twelve shillings a cord, how many cords of wood can be bought for one hundred and forty-four shillings?

12. *How many feet* in twelve inches? — in forty-eight inches? — in twenty-four inches? — in sixty inches? — in seventy-two inches? — in eighty-four inches? — in one hundred and eight inches? — in ninety-six inches? — in one hundred and forty-four inches? — in one hundred and thirty-two inches?

LESSON THIRTEENTH.

1. A man sold ten cows for one hundred and twenty dollars; *how much* was that for one cow? — for three cows? — for eight cows? — for five cows?

2. *How many* trunks, at eight dollars apiece, can be bought for ninety-six dollars?

3. One hundred and thirty-two dollars were divided equally among twelve men; *how many dollars* did one man receive? — three men? — seven men?

4. If nine candles are made from one pound of tallow, how many can be made from eight pounds? How many dozens?

5. A merchant sold ten hats, at four dollars apiece; how many dollars did they come to? He laid out the money for flour, at five dollars a barrel; how many barrels of flour did he buy?

6. A woman bought nine pounds of sugar, at eight cents a pound; how much did it come to? She paid for it with butter, at twelve cents a pound; how many pounds of butter did it take?

7. *How many* pounds of tea, at six shillings a pound,

can be bought for twelve pounds of butter, at one shilling a pound? — for eighteen pounds? — for six pounds?

8. If one man can do a piece of work in twenty-four days, how long will it take eight men to do it?

9. *Eight times nine are* how many times twelve? — how many times six?

10. *How many times is ten contained* in one hundred and twenty? — in thirty? — in eighty? — in fifty?

11. *Ten times four are* how many times five? — how many times eight?

12. *Six times three are* how many times nine? — how many times two? — how many times one?

13. If it takes eight knots of yarn to knit one pair of stockings, *how many pairs* can be knit from thirty-two knots? — from sixty-four knots? — from eighty knots?

14. How many bushels of apples, at two shillings a bushel, can be bought for a load of plaster worth twenty-four-shillings?

15. Ann bought a copy-book for twelve cents, a bottle of ink for nine cents, and a steel pen for four cents, and paid for them in five-cent pieces; how many five-cent pieces did it take?

16. How many times is nine contained in six times six?

17. A man had three fields, each containing eight acres; how large a field would they make if they were all united? How many two acre lots would they make? How many six acre lots?

18. A man had sixty bushels of wheat; he sowed twelve bushels, and had the rest of it floured; how many barrels of flour had he, allowing four bushels to make one barrel?

19. *Three times eight are* how many times two? — how many times twelve? — how many times six? — how many times four?

20. *Which is the most*, twenty-five, and ten, and eight, or five times eight, and how much? — five times eleven, or six times nine? — two times two, and two times two, or four times four?

MISCELLANEOUS EXERCISES.*

1. John had nine peaches, and his mother gave him four more; how many had he then?

2. If twelve lemons make a dozen, how many lemons are a dozen and five?

3. Samuel bought a pine-apple for nine cents, and a quart of chestnuts for eight cents; how many cents did he pay out?

4. Richard has a string eleven feet long, and another six feet long; if he ties them together, how far will they reach?

5. *How many are eight and five?* — nine and four?

6. *How many are seven and eight?* — twelve and six?

7. *How many are eleven and nine?* — five and two?

8. *How many are ten and nine?* — twelve and eleven?

9. A butcher bought lambs as follows; of one man he bought four, of another three, of another two, of another four, and of another enough to make his number seventeen; how many did he last buy?

10. A man, owing nineteen dollars, paid at one time nine dollars, and at another time four dollars; how much did he then owe?

11. Albert hoed eighteen rows of corn in three hours; he hoed six rows the first hour, and seven rows the second hour; how many rows did he hoe the last hour?

12. Dick bought a pair of skates in the fall for twenty cents, and after using them three months, sold them for thirteen cents; how much was that less than he gave for them?

13. Four, and three, and two, and seven, and how many make twenty?

14. Nine from eighteen *leaves how many?* Six from fifteen —?

15. Take thirteen from nineteen, and how many remain?

16. Seven, and eight, and three, and how many make twenty-five?

17. A man bought two cows, at twelve dollars apiece, and

* See Note 7.

three sheep at two dollars apiece ; how much did they come to ?

18. How much will three sets of chairs cost, at twelve dollars a set ?

19. Two men, A and B, start from the same place, at the same time, and travel the same way ; A travels fifty-two miles a day, and B forty-four miles a day ; *how far apart will they be at the end of one day ? — of two days ? — of six days ? — of ten days ?*

20. Two men depart from the same place, and travel in opposite directions, one at the rate of five miles an hour, the other at the rate of four miles an hour ; *how far apart will they be at the end of one hour ? — of seven hours ? — of twelve hours ?*

21. Five times nine, and how many more make fifty ?

22. Nine times nine, and how many more make one hundred ?

23. Five times twelve, and how many more make seventy-five ?

24. Three times six, and how many more make twenty-five ?

25. A lady paid sixteen dollars for eight yards of satin ; how much was that a yard ?

26. If a printer can set the types for six pages of a book in one day, how many days will it take him to set the types for a book of seventy-two pages ?

27. How much flour, at seven dollars a barrel, can be bought for sixty-three dollars ?

28. When oranges are five cents apiece, *how many* can be bought for three ten-cent pieces ? — for two ten-cent pieces ? — for six five-cent pieces ? — for three ten-cent pieces, and three five-cent pieces ?

29. *How many times is eight contained in sixteen ? — in forty ? Six in seventy-two how many times ? Seven in sixty-three — ?*

30. *How many times five are three times ten ? — two times ten ? — three times ten and three times five ?*

31. *Five times twelve are how many times ten ? — how many times six ?*

32. *Four times seven are how many times one ? — how many times two ?*

33. A miller put into a bin at one time seven bushels

of wheat, at another time ten bushels, and at another time five bushels; how many bushels were then in the bin?

34. A clerk sold to one man nine pounds of butter, to another man twelve pounds, and to another man six pounds; how many pounds did he sell?

35. In a pasture are fifteen cows, ten oxen, and six calves; how many cattle in the pasture?

36. *How many are seven and four?* — eleven and ten?

37. *How many are eight and nine?* — twelve and twelve?

38. *How many are eleven, and six, and seven?* — five, and nine, and twelve?

39. Frank bought a book for thirteen cents, and sold it for twenty-two cents; how much did he make by his bargain?

40. Oscar gave a beggar five cents, Orlando gave him three cents, Oliver four cents, Edwin two cents, and their teacher enough to make the whole number twenty-four cents; how many cents did the teacher give?

41. A man bought a mirror for fifteen dollars, for which he gave six bushels of wheat worth eight dollars, seven bushels of corn worth four dollars, and the rest in money; how much money did he pay?

42. A man sold a load of wood for eighteen shillings; he laid out eight shillings of the money for tea, and six shillings for sugar; how many shillings had he to carry home?

43. I owe a merchant twenty dollars; if I let him have twenty pounds of wool worth eight dollars, and forty pounds of butter worth six dollars, how much will I then owe him?

44. A farmer, having forty bushels of wheat, sold sixteen bushels, sowed twelve bushels, and exchanged five bushels for a barrel of flour; how many bushels had he left?

45. *How many inches in twelve feet?* — in eight feet? — in five feet? — in eleven feet? — in seven feet?

46. Six men bought a horse for seventy dollars, and five of them paid twelve dollars apiece; how much did the sixth man pay?

47. Twelve times eight are how many more than eighty?

48. Six times eleven, and how many more make as much as eight times nine?

49. A hatter sold three cases of hats, each case containing twelve hats, and one other case containing fourteen hats; how many hats did he sell?

50. A boy bought ten oranges, at four cents apiece; he kept four of them, and sold the others at five cents apiece; how much did he pay for the oranges? How many did he sell? How much did they come to? How much did he make on one orange? How much on what he sold? How much more did he pay for the ten oranges than he got for the six?

51. If twelve men receive eleven dollars apiece, how many dollars will they all receive?

52. How many acres of land worth ten dollars an acre, must be given in exchange for five acres worth twelve dollars an acre?

53. A man spends twenty-eight dollars in four weeks; how much is that a week? How much a day?

54. A man sold a horse for eighty-eight dollars, and took his pay in mackerel at eleven dollars a barrel; how many barrels did he receive?

55. A thrasher thrashed one hundred and thirty-two bushels of grain in twelve hours; how many bushels was that an hour?

56. If four barrels of beef cost thirty-two dollars, how much will one barrel cost? Three barrels? Five barrels? Eleven barrels?

57. A boy, having twelve apples, kept four of them, and gave the rest to two of his companions; how many did he give to each?

58. One man owes me five dollars, another owes me six dollars, another eight dollars, and another three dollars; what is the amount due me?

59. George is eleven years old, Thomas is six years older than George, Charles is ten years older than Thomas, and George's father is seven years older than Charles; how old is George's father?

60. *How many are* fifteen, and ten, and six? — five, and six, and eight, and three?

61. *How many are* eleven, and six, and ten, and seven? — five, and two, and nine, and three, and seven, and four?

62. A man bought a wagon for thirty-two dollars, and gave eight dollars for having it painted; he then sold it for fifty dollars; did he make or lose by the bargain, and how much?

63. A hogshead of molasses, containing sixty-three gallons, sprung a leak, and when it was discovered, fourteen gallons had leaked out; how many gallons remained in the hogshead?

64. If the interest of one dollar, for one year, be six cents, *what is the interest* of two dollars for the same time? — of eight dollars? — of ten dollars?

65. If the interest of one hundred dollars be six dollars for one year, *how much* will be the interest of it for two years? — for four years? — for eight years?

66. There is a room ten feet wide; how many inches wide is it? How many boards ten inches wide, will it take for the floor?

67. Six boys found a purse containing thirty-six dollars, which they shared equally among them; *how many dollars had* two of the boys? — five of the boys?

68. A fishmonger, having seventy-five pounds of fish in his stall, sold to one person fourteen pounds, to another eight pounds, to another twelve pounds, to another seven pounds, to another ten pounds, and to another eight pounds; how many pounds had he left?

69. A market woman, having eighty pounds of butter, sold thirty pounds to an innkeeper, twenty pounds to a grocer, eighteen pounds to a merchant, and the rest to a tinner; how many pounds did the tinner buy?

70. Fourteen, and eight, and twelve, and seven, and ten, and how many make seventy-five?

71. Thirty, and twenty, and eighteen, and how many make eighty?

72. Twenty-one from thirty-two *leaves how many?* Thirty-one from forty-two —? Forty-one from fifty-two —? Sixty-one from seventy-two —?

73. *Which is the most*, four times eight bushels, or five times seven bushels, and how much? — six times seven days, or four times eleven days? — two times twelve dollars, or five times four dollars?

74. Three times eight, and two times four, and *how many more make* forty?

75. Seven times six, and eight, and six, and how many more make sixty?

76. If nine yards of broadcloth cost twenty-seven dollars, *how much will* two yards cost? — five yards? — seven yards?

77. *Four times three are* how many times two? — how many times six?

78. *Twenty-four are how many times* twelve? — eight? — six? — four? — two?

PART SECOND.

NOTATION AND NUMERATION.

LESSON I.

1. What is a *single* thing, as a dollar, a horse, a man, &c., called ?

Ans. *A single thing, as a dollar, a horse, a man, &c., is called a unit, or one.*

2. What are one and one more called ? two and one more ? three and one more ? and so on to nine.

3. What are these names, one, two, three, four, five, six, &c., called ?

Ans. *They are called numbers.*

4. Then what are numbers ?

Ans. *Words expressing how many, as one, two, three, &c., are called numbers.*

5. Have any methods been devised for expressing numbers, shorter than writing ~~them out~~ in words ?

Ans. *Two shorter methods have been devised.*

6. What are these two methods called ?

Ans. *One is called the Arabic method, because it was invented by the Arabians ; the other is called the Roman method, because it was invented by the Romans.*

7. Which method is in general use ?

Ans. *The Arabic method, by certain characters, called figures.*

8. In the Arabic method, how many numbers have each a separate character to represent it ?

Ans. *The first nine numbers.*

9. How are these nine characters made, and what does each signify ?

Ans. *1 signifies one, 2 two, 3 three, 4 four, 5 five, 6 six, 7 seven, 8 eight, 9 nine.*

10. Is any other character ever used in the Arabic method?

Ans. *There is another character used, called a cipher, nought, or nothing, because it denotes the absence of a thing; it is made thus, 0.*

11. If you wished to express that a barrel contained seven pecks of wheat, by what figure would you do it? If nine pecks, what figure? Five pecks? Three pecks? Two pecks? Four pecks? Eight pecks? Six pecks? One peck? No pecks?

12. How is ten represented?

Ans. *It is represented by the unit figure, 1, written at the left hand of a cipher; thus, 10, ten.*

13. When two figures are written to express one number, what is the right hand figure called? The left hand figure?

Ans. *The right hand figure is called units, and the left hand figure tens.*

14. May there be more than one ten in a number?

Ans. *There may be one, two, three, or more tens, just as there are one, two, three, or more units.*

15. How many units does it take to make one ten?

Ans. *It takes ten units, or ten single things to make one ten, just as it takes ten cents to make one ten-cent piece.*

16. What is the value of each ten, from one ten to nine tens?

Ans.	One ten is ten,	written	10;
	two tens are twenty,	"	20;
	three " " thirty,	"	30;
	four " " forty,	"	40;
	five " " fifty,	"	50;
	six " " sixty,	"	60;
	seven " " seventy,	"	70;
	eight " " eighty,	"	80;
	nine " " ninety,	"	90.

17. How are the numbers between the tens, as twenty-five, thirty-one, fourteen, fifty-nine, &c., expressed?

Ans. *By writing the units on the right hand of the tens, in place of the ciphers.*

18. You may now cover the columns of words, in the following table, with your hand, or with a slip of paper, and read the columns of figures.

a.	34, thirty-four.	67, sixty-seven.
b.	35, thirty-five.	68, sixty-eight.
ce.	36, thirty-six.	69, sixty-nine.
ir.	37, thirty-seven.	70, seventy.
e.	38, thirty-eight.	71, seventy-one.
.	39, thirty-nine.	72, seventy-two.
en.	40, forty.	73, seventy-three.
ht.	41, forty-one.	74, seventy-four.
le.	42, forty-two.	75, seventy-five.
.	43, forty-three.	76, seventy-six.
ven.	44, forty-four.	77, seventy-seven.
lve.	45, forty-five.	78, seventy-eight.
irteen.	46, forty-six.	79, seventy-nine.
een.	47, forty-seven.	80, eighty.
teen.	48, forty-eight.	81, eighty-one.
hteen.	49, forty-nine.	82, eighty-two.
eteen.	50, fifty.	83, eighty-three.
enty.	51, fifty-one.	84, eighty-four.
enty-one.	52, fifty-two.	85, eighty-five.
enty-two.	53, fifty-three.	86, eighty-six.
enty-three.	54, fifty-four.	87, eighty-seven.
enty-four.	55, fifty-five.	88, eighty-eight.
enty-five.	56, fifty-six.	89, eighty-nine.
enty-six.	57, fifty-seven.	90, ninety.
enty-seven.	58, fifty-eight.	91, ninety-one.
enty-eight.	59, fifty-nine.	92, ninety-two.
enty-nine.	60, sixty.	93, ninety-three.
ty.	61, sixty-one.	94, ninety-four.
ty-one.	62, sixty-two.	95, ninety-five.
ty-two.	63, sixty-three.	96, ninety-six.
ty-three.	64, sixty-four.	97, ninety-seven.
	65, sixty-five.	98, ninety-eight.
	66, sixty-six.	99, ninety-nine.
		100, one hundred.

LESSON II.

What are 1 ten and 1 unit called? 1 ten and 2 units? and 5 units? 3 tens and 4 units? 4 tens and 7? 5 tens and 4 units? 6 tens and 5 units? 7 tens and 8? 8 tens and 8 units? 9 tens and 7 units? &c.

Of what is the number forty made up?

3. *Of 4 tens and no units.*

Of what is the number twenty-six made up? *The* r forty-eight? — thirty-one? — seventy-five? — *sepe*?

4. What do you unite, to form the number twenty-three? — fifty-seven? — sixty? — ninety? — sixteen? — eighty-four? &c.

5. How is one hundred expressed?

Ans. By writing two ciphers at the right hand of the unit, 1; thus, 100, one hundred.

6. What do the ciphers express?

Ans. They show that there are no units nor tens in the number.

7. When three figures are written to express one number, what is each figure called?

Ans. The right hand figure is units, the second tens, and the third hundreds.

8. How are 3 hundreds 6 tens and 5 units read?

Ans. Three hundred and sixty-five.

9. How would you express two hundred? — three hundred? and so on to nine hundred.

10. What are 4 hundreds 9 tens and 2 units called? 8 hundreds 7 tens and 5 units?

11. How is one hundred and ninety-three expressed?

Ans. By 1 hundred 9 tens and 3 units.

12. How would you express six hundred and fifteen? — two hundred and forty-six? — five hundred and ninety-nine? — eight hundred and twenty? — four hundred and six?

13. In expressing three hundred and sixty-five, what place does the 5 occupy? The 6? The 3?

14. 10 hundreds make what?

Ans. One thousand.

15. How is it expressed?

Ans. By writing three ciphers on the right hand of the unit, 1; thus, 1000, one thousand.

16. How do you express two thousand? Three thousand? Four thousand? Five thousand? &c.

17. How many thousands in 30 hundreds? — in 50 hundreds? — in 90 hundreds? — in 40 hundreds?

18. What is notation?

Ans. The expressing of numbers by letters or figures, is called Notation.

19. What is numeration?

Ans. The reading of any number set down in figures, is called Numeration.

20. What are the names of the places of figures, counted from the right hand, as seen below ?

	Million.	Hundreds of thousands.	Tens of thousands.	Thousands.	Hundreds.	Tens.	Units.
Ans.	1	2	3	4	5	6	7

21. *What is the value* of the 4 in the above number ? — of the 6 ? — of the 3 ? — of the 7 ? — of the 5 ? — of the 2 ? — of the 1 ?

22. How is the whole number read ?

LESSON III.

EXERCISE IN NUMERATION.

What numbers are expressed by the following figures ?

23	14	10	100	343	2100	3091
45	75	82	500	434	9070	4082
66	37	73	400	309	7090	2075
89	98	55	900	207	1050	6204
91	63	85	620	702	2460	3708
17	72	18	210	1000	4620	452
40	56	32	970	3000	5910	47
61	43	90	444	8000	8123	20
59	25	27	591	6200	6691	999
07	00	20	716	2500	3434	4276

EXERCISE IN NOTATION.

Express the following numbers by figures, upon your slate, or the blackboard.

Thirty. Twenty-six. Eleven. Fifty-five.
 Eighty-two. Ninety-four. Nineteen. Seventy-two.
 Seventy-one. Thirty-eight. Eight. Ninety-nine.
 One hundred. Five hundred and twenty.
 Three hundred and seventeen.

Four hundred and fifty-nine. Twenty-eight.
 Three hundred and seventy-four. One thousand.
 Six thousand. Five thousand three hundred.
 Two thousand one hundred and thirty.
 Eight thousand three hundred and twenty-five.

LESSON IV.

1. How does the Roman differ from the Arabic method of notation?

Ans. *In the Arabic method, numbers are expressed by figures, and in the Roman method, by letters.*

2. How many letters are generally used in the Roman method, and what are they?

Ans. *Seven, I, V, X, L, C, D, and M.*

3. What is the value of each of these letters, when standing alone?

Ans. *I represents one, V five, X ten, L fifty, C one hundred, D five hundred, and M one thousand.*

4. How may any number be expressed by these seven letters?

Ans. *By various combinations, as seen in the following*

TABLE.

I	1.	XX	20.	XC	90.
II	2.	XXI	21.	C	100.
III	3.	XXII	22.	CI	101.
IV	4.	XXIII	23.	CIX	109.
V	5.	XXIV	24.	CXX	120.
VI	6.	XXV	25.	CL	150.
VII	7.	XXVI	26.	CC	200.
VIII	8.	XXVII	27.	CCC	300.
IX	9.	XXVIII	28.	CCCC	400.
X	10.	XXIX	29.	D	500.
XI	11.	XXX	30.	DC	600.
XII	12.	XXXI	31.	DCC	700.
XIII	13.	XXXV	35.	DCCC	800.
XIV	14.	XL	40.	DCCCC	900.
XV	15.	XLIX	49.	M	1000.
XVI	16.	L	50.	MX	1010.
XVII	17.	LX	60.	MC	1100.
XVIII	18.	LXX	70.	MD	1500.
XIX	19.	LXXX	80.	MDCCCXLVIII	1848

5. From the above table may be deduced three rules, to assist us in writing numbers by the Roman method of notation; what is the first?

ANS. *Repeating a letter repeats its value; thus, II represents 2, XX 20.*

6. What is the second?

ANS. *A letter representing a less number placed before one representing a greater, the less number is to be taken from the greater; thus, IX represents 9, XL 40.*

7. What is the third?

ANS. *A letter representing a less number placed after one representing a greater, the less number is to be united to the greater; thus, VI represents 6, XV 15.*

ADDITION.

LESSON I.

1. John bought a slate for 25 cents, and a copy-book for 8 cents; how many cents did he give for both?

SOLUTION. *25 cents and 8 cents are 33 cents. Therefore, he gave 33 cents.*

2. Peter bought a wagon for 36 cents, and sold it so as to gain 9 cents; how many cents did he get for it?

3. Fanny gave 15 pinks to one girl, 8 to another, and had 7 left; how many pinks had she at first? How many did she give away?

4. A cabinet-maker bought a second-hand side board for 15 dollars, and after expending 8 dollars in repairs, he sold it so as to gain 5 dollars; how many dollars did he get for it?

5. A man bought 3 cows; for the first he gave 9 dollars, for the second 12 dollars, and for the third 10 dollars; how many dollars did he give for all the cows?

6. Samuel bought a book for 20 cents, a knife for 12 cents, an orange for 4 cents, and some walnuts for 8 cents; how many cents did he spend?

7. When two or more numbers are united together, (as in the foregoing examples,) what is the process called?

Ans. *It is called Addition.*

8. Then, what is addition?

Ans. *Addition is the putting together of two or more numbers, so as to make one whole number.*

9. What is this whole number, or answer sought, called?

Ans. *The whole number, or answer, is called the Sum, or Amount.*

10. What is the amount of 3, 2, 4, 7, 3, and 5?

11. What is the amount of 4 dollars, 3 dollars, 7 dollars, 2 dollars, 8 dollars, and 9 dollars?

12. What is the amount of 25 and 8? — of 36 and 9? — of 15, 8, and 7?

13. What is the sum of 15 dollars, 8 dollars, and 5 dollars? — of 9 dollars, 12 dollars, and 10 dollars?

14. What is the sum of 20 cents, 8 cents, 12 cents and 4 cents?

15. One man owes me 14 dollars, another owes me 6 dollars, another 8 dollars, and another 3 dollars; what is the sum due to me?

16. Alfred is 15 years old, Thomas is 11, Nathan 7, Edwin 10, Oliver 8, and Richard 6; what is the sum of their ages?

17. What is the amount of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12?

LESSON II.*

1. Is addition ever expressed in any other way than by words?

Ans. *It is often expressed by a sign.*

2. What is the sign, and how is it made?

Ans. *A cross, +, one line horizontal, and the other perpendicular, is the sign of Addition.*

* See Note 8.

3. What does it show ?

ANS. *It shows that numbers with this sign between them are to be added together.*

4. How many are $14 + 5 + 3$?

5. What is the sum of $16 + 9 + 2$?

6. What is the amount of $21 + 10 + 5 + 4 + 1$?

7. How can you express that one number is equal to another ?

ANS. *By placing the sign of equality between the numbers.*

8. What is the sign of equality ?

ANS. *Two parallel, horizontal lines, $=$, are the sign of equality.*

9. What does it show ?

ANS. *It shows that the number before it is equal to the number after it.*

10. How may $5 + 3 = 8$ be read ?

ANS. *5 and 3 added together are equal to 8 ; or, the sum of 5 and three is 8 ; or, 5 and 3 are 8.*

11. Which way is it commonly read ?

ANS. *5 and 3 are 8.*

12. *How do you read* $14 + 5 = 19$? — $12 + 9 = 21$? — $16 + 5 + 3 = 24$? — $8 + 3 + 6 + 2 = 19$?

13. What is the sign of addition usually called ?

ANS. *It is usually called plus, which means more, or added to.*

14. Then, in what other ways may $5 + 3 = 8$ be read ?

ANS. *5 plus 3 are equal to 8 ; or, 5 plus 3 equal 8 ; or, 5 plus 3 are 8.*

15. You may now read $6 + 5 + 3 = 14$. $11 + 7 = 18$. $8 + 12 + 5 = 25$. $20 + 9 + 8 = 37$. $3 + 8 + 0 + 4 = 15$.

16. You must now adopt one of the forms given in this lesson, and commit perfectly to memory the following

ADDITION TABLE.

2 + 0 = 2	3 + 0 = 3	4 + 0 = 4	5 + 0 = 5
2 + 1 = 3	3 + 1 = 4	4 + 1 = 5	5 + 1 = 6
2 + 2 = 4	3 + 2 = 5	4 + 2 = 6	5 + 2 = 7
2 + 3 = 5	3 + 3 = 6	4 + 3 = 7	5 + 3 = 8
2 + 4 = 6	3 + 4 = 7	4 + 4 = 8	5 + 4 = 9
2 + 5 = 7	3 + 5 = 8	4 + 5 = 9	5 + 5 = 10
2 + 6 = 8	3 + 6 = 9	4 + 6 = 10	5 + 6 = 11
2 + 7 = 9	3 + 7 = 10	4 + 7 = 11	5 + 7 = 12
2 + 8 = 10	3 + 8 = 11	4 + 8 = 12	5 + 8 = 13
2 + 9 = 11	3 + 9 = 12	4 + 9 = 13	5 + 9 = 14

6 + 0 = 6	7 + 0 = 7	8 + 0 = 8	9 + 0 = 9
6 + 1 = 7	7 + 1 = 8	8 + 1 = 9	9 + 1 = 10
6 + 2 = 8	7 + 2 = 9	8 + 2 = 10	9 + 2 = 11
6 + 3 = 9	7 + 3 = 10	8 + 3 = 11	9 + 3 = 12
6 + 4 = 10	7 + 4 = 11	8 + 4 = 12	9 + 4 = 13
6 + 5 = 11	7 + 5 = 12	8 + 5 = 13	9 + 5 = 14
6 + 6 = 12	7 + 6 = 13	8 + 6 = 14	9 + 6 = 15
6 + 7 = 13	7 + 7 = 14	8 + 7 = 15	9 + 7 = 16
6 + 8 = 14	7 + 8 = 15	8 + 8 = 16	9 + 8 = 17
6 + 9 = 15	7 + 9 = 16	8 + 9 = 17	9 + 9 = 18

17. $9 + 2 + 6 + 4 + 5 =$ how many?

18. $1 + 3 + 5 + 7 + 8 =$ how many?

19. $1 + 2 + 3 + 4 + 5 + 6 =$ how many?

20. $8 + 9 + 0 + 2 + 4 + 5 =$ how many?

21. $6 + 2 + 5 + 0 + 8 + 3 =$ how many?

LESSON III.

1. Lewis found 12 eggs in one nest, and 15 in another how many eggs did he find in both nests?

SOLUTION. $12 \text{ eggs} + 15 \text{ eggs} = 27 \text{ eggs}$. Therefore in both nests he found 27 eggs.

2. James is 16 years old, and Charles is 10 year older than James; how old is Charles?

3. A lady went out to make some purchases; she paid 12 dollars for a silk dress, 7 dollars for a satin hat, an

10 dollars for other articles; how much money did she pay out?

4. A cabinet-maker sold a bureau for 20 dollars, and a table for 14 dollars; how much did he receive for both?

SOLUTION. $20 = 2 \text{ tens}$, and $14 = 1 \text{ ten and } 4 \text{ units}$; $2 \text{ tens} + 1 \text{ ten} = 3 \text{ tens}$; $3 \text{ tens} = 30$, and $30 + 4 = 34$. Therefore, he received 34 dollars.

5. One clerk receives 20 dollars a month, and another receives 18 dollars; how many dollars do both receive?

6. A boy bought a sled, for which he gave a pair of skates worth 20 cents, and 9 cents in money; he afterwards sold the sled for 10 cents more than it cost him; how many cents did he get for it?

7. *How many are* $20 + 14$? — $20 + 18$?

8. A man bought a wagon for 35 dollars; he gave 5 dollars to have it repaired, and 3 dollars to have it painted, and then sold it for 5 dollars more than it had cost him; how much did he get for it?

9. A market-man sold 5 firkins of butter for 50 dollars, 3 cheeses for 10 dollars, and a lot of poultry for 5 dollars; how many dollars did he receive for the whole?

10. A hunting party shot 50 pigeons, 9 wild ducks, 6 snipes, and 1 partridge; how many birds did they kill?

11. One man owes me 20 dollars, another owes me 9 dollars, and another 8 dollars; how many dollars are due to me?

12. George gave 12 cents to the Home Missionary Society, James gave 8 cents more than George, Thomas gave 10 cents more than James, and George's father gave 8 cents more than Thomas; *how many cents did James give? — Thomas? — George's father?*

13. A bookseller sold in one week 15 arithmetics, 9 grammars, 7 geographies, 10 reading books, and 8 spelling books; how many books did he sell in the week?

14. A grocer sold to one man 18 pounds of sugar, to another 12 pounds, to another 9 pounds, to another 6 pounds, and to another 5 pounds; how many pounds of sugar did he sell?

15. A butcher killed sheep as follows: on Monday 5, on Tuesday 8, on Wednesday 3, on Thursday 7, on Fri-

day 2, and on Saturday 10; how many sheep did he kill during the week?

16. A gentleman paid his expenses for 3 months, which were as follows: board bill 25 dollars, washing bill 6 dollars, tailor's bill 2 dollars, store bill 10 dollars, livery bill 9 dollars, and shoe bill 7 dollars; what was the amount of his expenses for 3 months?

17. $16 + 10 =$ how many?

18. $12 + 7 + 10 =$ how many?

19. $20 + 9 + 10 =$ how many?

20. What is the sum of $35 + 5 + 3 + 5$? — of $50 + 10 + 5$?

21. What is the sum of $50 + 9 + 6 + 1$? — of $20 + 9 + 8$?

22. What is the amount of 12 years + 8 years + 10 years + 8 years? — of 15 books + 9 books + 7 books + 10 books + 8 books?

23. What is the amount of 18 pounds + 12 pounds + 9 pounds + 6 pounds + 5 pounds?

24. 5 sheep + 8 sheep + 3 sheep + 7 sheep + 2 sheep + 10 sheep = how many sheep?

25. 25 dollars, 6 dollars, 2 dollars, 10 dollars, 7 dollars, and 9 dollars, are how many dollars?

LESSON IV.*

1. A man had 30 sheep in one pasture, and 14 in another; how many sheep had he in the two pastures?

SOLUTION. He had 30 sheep + 14 sheep; $30 = 3$ tens, and $14 = 1$ ten, and 4 units; 3 tens + 1 ten = 4 tens or 40, and $40 + 4 = 44$. Therefore, he had 44 sheep.

2. He had 60 geese in one flock, and 15 in another; how many geese had he?

3. In a certain fruit orchard 40 trees bear fall apples, and 13 trees bear harvest apples; how many apple trees in the orchard?

4. Ellen read 70 pages in her Sabbath school book in

* See Note 9.

one day, and 19 pages in the evening; how many pages did she read in all?

5. The next day she read 50 pages in the day time, and 17 pages in the evening; how many pages did she read in all that day?

6. Edwin gathered 20 quarts of walnuts, and Frank gathered 12 quarts; how many quarts did they both gather?

7. A man bought a pound of tea for 80 cents, and 2 quarts of molasses for 16 cents; how many cents did he pay out?

8. A man bought a roll of curtain paper for 40 cents, and 4 panes of glass for 11 cents; how much money did he expend?

9. A sofa costs 40 dollars, and a set of chairs 18 dollars; how many dollars must be paid for a sofa and a set of chairs?

10. *How many are* $30 + 14$? — $50 + 14$? — $70 + 14$?

11. *What is the sum of* $60 + 15$? — of $40 + 15$? — of $80 + 15$?

12. *What is the amount of* $70 + 19$? — of $20 + 19$? — of $30 + 19$?

13. $20 + 12 =$ how many? $50 + 12 =$ how many?

14. *How many are* $80 + 16$? — $40 + 16$? — $70 + 16$?

15. *How many are* $20 + 11$? — $11 + 30$? — $40 + 11$?

16. *How many are* $40 + 18$? — $18 + 50$?

LESSON V.

1. A farmer bought a yoke of cattle for 60 dollars, and a cart for 30 dollars; how many dollars did they cost him?

SOLUTION. *They cost him* $60 \text{ dollars} + 30 \text{ dollars}$; $60 = 6 \text{ tens}$, and $30 = 3 \text{ tens}$; $6 \text{ tens} + 3 \text{ tens} = 9 \text{ tens}$ or 90. *Therefore, they cost him 90 dollars.*

2. A farmer has 50 acres of wheat in one field, and 20 acres in another; how many acres of wheat has he?

3. A man has his money in two pocket-books; in one

of them are 40 dollars, and in the other 50 dollars; how much money has he?

4. Amelia gave away 20 plums, and had 60 left; how many plums had she at first?

5. A man sold a horse for 70 dollars, and a cutter and harness for 30 dollars: how many dollars did he get for his horse, cutter, and harness?

6. A man killed 2 calves, one of which weighed 80 pounds, and the other 70 pounds; how much did they both weigh?

SOLUTION. *They both weighed 80 pounds + 70 pounds; 80 = 8 tens, and 70 = 7 tens; 8 tens + 7 tens = 15 tens, and 15 tens = 150. Therefore, they both weighed 150 pounds.*

7. An old gentleman being asked his age, said, he was 40 years old when his youngest son was born, who was then 50 years of age; what was the age of the father?

8. Richard had 70 marbles, and he bought 40 more; how many marbles had he then?

9. A merchant bought two pieces of carpeting; one piece contained 60 yards, and the other 80 yards; how many yards of carpeting in the two pieces?

10. A rope-maker made two ropes, one 70 feet long, and the other 100 feet long; what was their united length?

11. A blacking manufacturer sold 90 dozen boxes of blacking in one village, and 60 dozen boxes in another; how many dozen boxes did he sell in the two villages?

12. *How many are 6 tens + 3 tens? — 5 tens + 2 tens? — 20 + 60? — 70 + 30? — 80 + 70? — 40 + 50?*

13. How many yards are 60 yards + 80 yards? 60 pounds + 80 pounds are how many pounds?

14. 60 men + 30 men are how many men?

15. How many miles are 40 miles + 50 miles? How many cents are 50 cents + 40 cents?

16. 80 feet + 90 feet = how many feet? 70 minutes + 100 minutes = how many minutes?

17. *How many are 2 tens + 6 tens + 5 tens + 3 tens? — 8 tens + 4 tens + 7 tens? — 9 tens + 10 tens?*

LESSON VI.*

1. A boy had 54 cents, and his father gave him 43 more ; how many cents had he then ?

SOLUTION. *He had 54 cents + 43 cents ; $54 = 5$ tens and 4 units, and $43 = 4$ tens and 3 units ; 5 tens + 4 tens = 9 tens or 90, 4 units + 3 units = 7 units, and $90 + 7 = 97$. Therefore, he had 97 cents.*

2. Enos gave 21 cents for a picture, and 18 cents for a frame ; how much did the picture and frame cost him ?

3. Alva gave 26 walnuts for a top, and 11 walnuts for a string ; how many walnuts did his top and string cost him ?

4. A man had 14 sheep in one pasture, 32 in another, and 93 in another ; how many sheep had he in the three pastures ?

5. A farmer has three fields ; one contains 30 acres, another 63 acres, and another 7 acres ; how many acres in the three fields ?

6. A lady purchased for her daughter, an arithmetic for 45 cents, a slate for 22 cents, and some quills for 12 cents ; what was the amount of her purchases ?

7. In July are 31 days, in August 31 days, and in September 30 days ; how many days in July, August, and September ?

8. In an orchard there are 24 trees that bear plums, 36 trees that bear apples, and 18 trees that bear peaches ; how many trees in the orchard ?

SOLUTION. *There are 24 trees + 36 trees + 18 trees. First find the amount of the tens, and then of the units ; 2 tens + 3 tens + 1 ten = 6 tens or 60 ; $4 + 6 + 8 = 18$, and $60 + 18 = 78$. Therefore, there are 78 trees in the orchard.*

9. Harry caught 23 fishes at one time, and 19 at another ; how many fishes did he catch ?

10. In a certain school there are 45 boys, and 38 girls ; how many scholars in that school ?

11. A man bought a pound of tea for 75 cents, and a gallon of molasses for 38 cents ; how much money did he pay for both ?

* See Note 10.

12. How many yards in two pieces of sheeting, one piece measuring 34 yards, and the other 29 yards?

13. One man gave the American Tract Society 34 dollars, another 45 dollars, and another 52 dollars; what was the amount of their donations?

14. A grocer bought of one woman 54 pounds of butter, of another 34 pounds, and of another 12 pounds; how many pounds did he buy in all?

15. *How many are* $21 + 18? - 26 + 11? - 23 + 19? - 45 + 38? - 75 + 38? - 34 + 29?$

16. How many apples are 32 apples + 53 apples?

17. How many peaches are 30 peaches + 63 peaches?

18. How many ducks are 45 ducks, 22 ducks, and 12 ducks?

19. How many skains of thread are 24 skains + 36 skains + 18 skains?

20. 34 pounds + 45 pounds + 52 pounds = how many pounds?

21. 54 dollars + 34 dollars + 12 dollars = how many dollars?

LESSON VII.

1. A chair-maker sold, in one week, 30 Windsor chairs, 36 cottage chairs, and 21 Grecian chairs; how many chairs did he sell?

2. A steamboat sank, with 45 gentlemen, 20 ladies, and 7 children on board; how many lost their lives?

3. I owe to one man 10 dollars, to another 20 dollars, and to another 15 dollars; how much am I in debt?

4. Three men bought a horse; the first man paid 15 dollars, the second man 20 dollars, and the third man the rest, which was as much as the first two men paid; how many dollars did the third man pay? How much did the horse cost?

5. In a certain school-room there are 12 grammars, 15 arithmetics, 14 geographies, and 12 copy-books; how many books in the school-room?

6. A man carried his produce to market; he sold his pork for 30 dollars, his butter for 24 dollars, and his cheese for 20 dollars; how much money did he receive?

7. A man sowed 35 bushels of wheat, 60 bushels of oats, and 46 bushels of barley; how many bushels of grain did he sow?

8. Joseph, having 26 marbles, bought 24 more; how many marbles had he then?

9. A man traveled 25 miles in one day, and 38 miles the next; how many miles did he travel in the two days?

10. How many yards of silk in 3 dress patterns, the first containing 12 yards, the second 14 yards, and the third 15 yards?

11. The distance from the ground to the limbs of a certain tree is 76 feet, and from the limbs to the top of the tree 59 feet; how many feet from the ground to the top of the tree?

12. $30 + 36 + 21 =$ how many?

13. $45 + 20 + 7 =$ how many?

14. $10 + 20 + 15 + 25 =$ how many?

15. $15 + 20 =$ how many? $35 + 20 + 15 =$ how many?

16. $12 + 15 + 14 + 12 + 10 + 6 =$ how many?

17. $30 + 20 + 50 + 24 =$ how many?

18. $35 + 60 + 46 =$ how many?

SUBTRACTION.

LESSON I.

1. Charles, having 18 cents, bought a book, for which he gave 6 cents; how many cents had he left?

SOLUTION. 6 cents from 18 cents leave 12 cents. Therefore, he had 12 cents.

2. John, having 12 apples, gave 5 of them to his brother; how many had he left?

3. Peter played at marbles; when he began he had 23, but when he had done he had only 12; how many did he lose?

4. A man bought a cow for 18 dollars, and sold her again for 22 dollars; how many dollars did he gain?

5. Charles is 9 years old, and Andrew is 13; what is the difference in their ages?

6. Samuel bought a book for 20 cents, and a knife for 12 cents ; how much more did he give for the book than for the knife ?

7. When one number is taken from another, (as in the foregoing examples,) what is the process called ?

Ans. *It is called Subtraction.*

8. Then, what is subtraction ?

Ans. *Subtraction is the taking of a less number from a greater.*

9. What is the greater number called ?

Ans. *The greater number is called the Minuend.*

10. What is the less number called ?

Ans. *The less number is called the Subtrahend.*

11. What is the number that is left, or the answer sought, called ?

Ans. *The number left after subtraction is called the Difference, or Remainder.*

12. 5 from 12 leaves 7 ; in this example, *which number is the minuend ? — the subtrahend ? — the remainder ?*

13. If the minuend be 8, and the subtrahend 3, what is the difference or remainder ?

14. If the subtrahend be 4, and the minuend 16, what is the remainder ?

15. If 9 be subtracted from 15, what will be the remainder ? *Which number will be the minuend ? — the subtrahend ?*

16. 18 subtracted from 25 leaves how many ?

17. Subtract 7 from 13, and what remains ?

18. Take 22 from 30, and what is the difference ?

LESSON II.

1. Is subtraction ever expressed by a sign ?

Ans. *A short horizontal line, —, is the sign of subtraction.*

2. What does it show ?

Ans. *It shows that the number after it is to be taken from the number before it.*

3. What does $8 - 5$ show ?

Ans. *It shows that 5 is to be subtracted from 8.*

4. What is the sign of subtraction usually called?

Ans. *It is usually called minus, which means less, or to be diminished by.*

5. In what ways may $8 - 5 = 3$ be read?

Ans. *5 from 8 leaves 3; 8 less 5 equals 3; 8 diminished by 5 equals 3; or, 8 minus 5 is equal to 3.*

6. Which method of reading do you prefer?

7. You may now read $14 - 6 = 8$. $18 - 11 = 7$.
 $25 - 12 = 13$. $50 - 34 = 16$. $15 - 0 = 15$.

8. 12 less 7 equals how many?

9. 21 diminished by 14 is equal to what number?

10. 19 minus 11 = how many?

11. 17 from 26 leaves how many?

12. Take 8 from 20, and what remains?

13. The difference between 43 and 34 is how much?

14. You must now adopt one of the forms of reading given in this lesson, and commit perfectly to memory the following

SUBTRACTION TABLE.

$2 - 2 = 0$	$4 - 4 = 0$	$6 - 6 = 0$	$8 - 8 = 0$
$3 - 2 = 1$	$5 - 4 = 1$	$7 - 6 = 1$	$9 - 8 = 1$
$4 - 2 = 2$	$6 - 4 = 2$	$8 - 6 = 2$	$10 - 8 = 2$
$5 - 2 = 3$	$7 - 4 = 3$	$9 - 6 = 3$	$11 - 8 = 3$
$6 - 2 = 4$	$8 - 4 = 4$	$10 - 6 = 4$	$12 - 8 = 4$
$7 - 2 = 5$	$9 - 4 = 5$	$11 - 6 = 5$	$13 - 8 = 5$
$8 - 2 = 6$	$10 - 4 = 6$	$12 - 6 = 6$	$14 - 8 = 6$
$9 - 2 = 7$	$11 - 4 = 7$	$13 - 6 = 7$	$15 - 8 = 7$
$10 - 2 = 8$	$12 - 4 = 8$	$14 - 6 = 8$	$16 - 8 = 8$
$11 - 2 = 9$	$13 - 4 = 9$	$15 - 6 = 9$	$17 - 8 = 9$
$3 - 3 = 0$	$5 - 5 = 0$	$7 - 7 = 0$	$9 - 9 = 0$
$4 - 3 = 1$	$6 - 5 = 1$	$8 - 7 = 1$	$10 - 9 = 1$
$5 - 3 = 2$	$7 - 5 = 2$	$9 - 7 = 2$	$11 - 9 = 2$
$6 - 3 = 3$	$8 - 5 = 3$	$10 - 7 = 3$	$12 - 9 = 3$
$7 - 3 = 4$	$9 - 5 = 4$	$11 - 7 = 4$	$13 - 9 = 4$
$8 - 3 = 5$	$10 - 5 = 5$	$12 - 7 = 5$	$14 - 9 = 5$
$9 - 3 = 6$	$11 - 5 = 6$	$13 - 7 = 6$	$15 - 9 = 6$
$10 - 3 = 7$	$12 - 5 = 7$	$14 - 7 = 7$	$16 - 9 = 7$
$11 - 3 = 8$	$13 - 5 = 8$	$15 - 7 = 8$	$17 - 9 = 8$
$12 - 3 = 9$	$14 - 5 = 9$	$16 - 7 = 9$	$18 - 9 = 9$

15. $18 - 7 =$ how many? $28 - 7 =$ how many?

16. $22 - 13 =$ how many? $33 - 5 =$ how many?

LESSON III.*

1. A man, owing 25 dollars, paid all but 8 dollars ; how many dollars did he pay ?

SOLUTION. *He paid the difference between 25 dollars and 8 dollars ; 25 dollars — 8 dollars = 17 dollars. Therefore, he paid 17 dollars.*

2. William paid 34 cents for a kite, and afterwards sold it for 9 cents less than he gave for it ; how much did he receive for it ?

3. James, having 15 cents, bought a pen knife, for which he gave 7 cents ; how many cents had he left ?

4. A weaver, having 46 yards of cloth to weave, wove 12 yards in one day ; how many yards remain to be woven ?

5. A lady paid 19 dollars for a silk cloak, and a muff ; for the muff she gave 8 dollars ; how much did the cloak cost her ?

6. In a window were 24 panes of glass, but some unruly boys have broken out 9 of them ; how many panes remain unbroken ?

7. From 25 subtract 8. From 34 subtract 9.

8. Take 12 from 46, and what remains ?

9. The minuend is 19, and the subtrahend 8 ; what is the remainder ?

10. The subtrahend is 9, and the minuend 24 ; what is the remainder ?

11. A man sold a cow for 20 dollars, and an ox for 40 dollars ; how much more did he get for the ox than for the cow ?

SOLUTION. *He got the difference between 40 dollars and 20 dollars ; 40 = 4 tens, and 20 = 2 tens ; 4 tens — 2 tens = 2 tens or 20. Therefore, he got 20 dollars more for the ox than for the cow.*

12. A man bought a horse for 70 dollars, and a harness for 30 dollars ; what was the difference between their costs ?

13. A butcher killed a calf, and a sheep ; the calf weighed 80 pounds, and the sheep weighed 50 pounds ; which was the heavier, and how much ?

* See Note 9.

14. A farmer paid 90 dollars for a yoke of cattle, and 40 dollars for a cart, yoke, and chain; how much did the cost of the cattle exceed that of the cart, yoke, and chain?

15. *What is the difference between 10 and 20? — 10 and 30? — 10 and 60? — 10 and 90?*

16. *What is the difference between 20 and 30? — 20 and 50? — 20 and 70? — 20 and 100?*

17. *How many are 80 — 50? — 60 — 40? — 100 — 70? — 90 — 80? — 100 — 50? — 80 — 80?*

LESSON IV.

1. A stationer, having 70 bunches of quills, sold 40 bunches; how many bunches had he left?

2. A shoe-dealer opened a case containing 60 pairs of buskins, and sold 20 pairs of them in one week; how many pairs had he left?

3. A paper-hanger, having 50 rolls of wall paper, used 30 rolls in papering 2 houses; how many rolls had he left?

4. A hogshead of molasses, containing 63 gallons, sprang a leak, and when it was discovered, only 31 gallons remained in the hogshead; how many gallons had leaked out?

SOLUTION. The difference between 63 gallons and 31 gallons had leaked out; 6 tens — 3 tens = 3 tens or 30, 3 — 1 = 2, and 30 + 2 = 32. Therefore, 32 gallons had leaked out.

5. One man receives 26 dollars a month, and another man receives 15; what is the difference in their wages?

6. A farmer, having 65 bushels of potatoes, sold 23 bushels to a neighbor; how many bushels had he left?

7. A man carried 94 pounds of wool to a factory; he sold 43 pounds of it for cash, and exchanged the remainder for cloth; how many pounds did he exchange for cloth?

8. A man, having 48 dollars, paid 30 dollars for a sofa, and the remainder for a set of chairs; how much did the chairs cost him?

9. A Practical Arithmetic costs 45 cents, and a Mental Arithmetic costs 25 cents; what is the difference in their prices?

10. Amanda's copy-book contains 28 pages, and 14 of them are written over; how many pages has she yet to write?

11. A man sold a load of wheat for 55 dollars, and took in payment flour to the amount of 34 dollars, and the balance in money; how much money did he receive?

12. *How many are* $100 - 60$? — $80 - 40$?

13. $63 - 31 =$ how many? $75 - 52 =$ how many?

14. $26 - 15 =$ how many? $89 - 63 =$ how many?

15. From 65 take 23, and how many remain?

16. *What is the difference between* 58 and 20? — between 25 and 45? — between 55 and 34?

LESSON V.*

1. A man, having 43 bushels of apples, sold 18 bushels to a neighbor; how many bushels had he left?

SOLUTION. He had left the difference between 43 bushels and 18 bushels; $43 = 3$ tens and 13 units, and $18 = 1$ ten and 8 units; 3 tens — 1 ten $= 2$ tens or 20; $13 - 8 = 5$, and $20 + 5 = 25$. Therefore, he had 25 bushels left.

Remark. When the unit figure in the subtrahend exceeds that in the minuend, we must always call the tens in the minuend 1 less, and the units 10 more.

2. A man has an orchard containing 52 trees; 25 of them bear fall apples, and the remainder bear winter apples; how many winter apple trees in the orchard?

3. Edgar's grammar cost him 63 cents, and his algebra 81 cents; what was the difference in their costs?

4. A man paid 95 dollars for a horse, and 68 dollars for a wagon; how much did the cost of the horse exceed the cost of the wagon?

5. A man is 45 years old, and his son is 27 years younger; how old is the son?

6. A physician who is now 75 years old, commenced the practice of medicine at the age of 26; how many years has he practised?

* See Note 11.

7. A man bought a pound of tea for 63 cents, and a gallon of molasses for 38 cents; how much more did he pay for the tea than for the molasses?

8. A farmer, having a flock of 80 sheep, lost 22 of them by disease; how many had he left?

SOLUTION. *He had left the difference between 80 sheep and 22 sheep; $80 = 7$ tens and 10 units; 7 tens $- 2$ tens $= 5$ tens or 50, $10 - 2 = 8$, and $50 + 8 = 58$. Therefore, he had 58 sheep left.*

9. A man traveled 50 miles in one day, and 34 miles the next; the difference in the two days' travel was how many miles?

10. Harry caught 40 fishes, and sold 21 of them; how many had he left?

11. A tree 54 feet high was broken off by the wind; the top part which fell was 46 feet long; how high was the stump which was left?

12. $43 - 25 =$ how many?

13. *How many are $72 - 48$? $96 - 30$?*

14. *How many are $100 - 71$? $100 - 29$? $80 - 60$? $75 - 45$? $41 - 16$? $84 - 48$?*

15. *How many are $120 - 70$? $125 - 75$? $115 - 96$? $142 - 78$? $200 - 120$? $200 - 155$?*

16. The subtrahend is 27, and the minuend 72; what is the remainder?

LESSON VI.

1. A farmer, having 60 bushels of wheat, sowed 46 bushels of it; how many bushels had he left?

2. A gentleman purchased a gold watch for 65 dollars, a chain for 8 dollars, and a key for 5 dollars; he afterwards sold the whole for 90 dollars; did he make or lose, and how much?

3. A merchant bought a piece of French broadcloth for 80 dollars, but it proving damaged, he is willing to sell it for 45 dollars; how much will he lose on it?

4. From a pile of wood containing 62 cords, was sold at one time 20 cords, at another time 15 cords, and at

another time 10 cords ; how many cords remained in the pile ?

SOLUTION. *First find the quantity sold ; 20 cords + 15 cords = 35 cords, and 35 cords + 10 cords = 45 cords ; then, there was left the difference between 62 cords and 45 cords ; 5 tens — 4 tens = 10, 12 — 5 = 7, and 10 + 7 = 17. Therefore, 17 cords remained in the pile.*

5. A merchant bought a bale of prints for 75 dollars, and sold them for 100 dollars ; how much did he gain ?

6. In a pasture are 64 sheep and 23 lambs ; how many more sheep than lambs are there in the pasture ?

7. William bought a cart for 34 cents, and sold it for 9 cents less than it cost him ; how much did he get for it ?

8. A butcher bought 30 lambs, and slaughtered 15 of them at one time ; how many were left ?

9. A man bought a bureau at auction for 14 dollars, and sold it again at private sale for 25 dollars ; how much did he make by the transaction ?

10. One teacher receives 30 dollars a month, and another receives 22 dollars a month ; what is the difference in their wages ?

11. A man sold a wagon for 60 dollars, which was 12 dollars more than it cost him ; how much did it cost him ?

12. Robert weighs 70 pounds, and Heman weighs 82 pounds ; which weighs the most, and how much ?

13. Mary is 12 years old, and her grandfather is 70 years old ; what is the difference in their ages ?

14. Rufus, having 48 marbles, lost 14, and sold 21 ; how many had he left ?

15. Oscar had 25 cents, and he gave his cousin, Levi, 8 ; how many had he left ? How many more had he than Levi ?

16. A mercer sold from a piece of silk containing 45 yards, at one time 15 yards, at another time 11 yards, and at another time 12 yards ; how many yards were left in the piece ?

17. A man, owing 60 dollars, paid at one time 20 dollars, at another time 16 dollars, and at another time 14 dollars ; how much did he then owe ?

18. A gentleman gave 60 dollars to humane institutions, as follows : 15 dollars to the Orphan-Asylum, 20 dollars to the institution for the Blind, and the remainder to the insti-

tution for the education of the Deaf and Dumb; what was the sum given to the last named institution?

19. Three men bought a horse for 80 dollars; the first man paid 25 dollars of the purchase money, and the second man 30 dollars; how much did the third man pay?

20. A dairy-man, having 90 pounds of butter, sold 25 pounds to one man, 30 pounds to another, and 22 pounds to another; how many pounds had he left?

21. $26 + 15 + 10 + 8 - 37 =$ how many?

22. $40 + 50 + 10 + 30 - 80 =$ how many?

23. $72 + 35 - 58 =$ how many?

24. $36 + 10 + 8 + 12 + 5 - 34 =$ how many?

MULTIPLICATION.

LESSON I.*

1. If one orange costs 5 cents, how many cents will 4 oranges cost?

SOLUTION. 4 oranges will cost 4 times as much as 1 orange; if 1 orange costs 5 cents, 4 oranges will cost 4 times 5 cents, which are 20 cents. Therefore, 4 oranges, at 5 cents apiece, will cost 20 cents.

2. If one bushel of apples costs 12 cents, how much will 3 bushels cost?

3. One gallon contains 4 quarts; how many quarts in 4 gallons? — in 9 gallons?

4. How much will 10 pairs of boots cost, at 5 dollars a pair?

5. 7 boys met a beggar, and each boy gave him 3 cents; how many cents did the beggar receive?

6. In the above examples, how have the answers been obtained?

ANS. By repeating one of the given numbers as many times as there were units in the other.

7. When one number is repeated several times, what is the process called?

ANS. It is called Multiplication.

8. Then, what is multiplication?

ANS. Multiplication is the method of repeating one of two numbers as many times as there are units in the other.

* See Note 4.

9. What is the number to be repeated called ?

ANS. *The number to be repeated is called the Multiplicand.*

10. What is the number which shows how many times the multiplicand is to be repeated called ?

ANS. *The number which shows how many times the multiplicand is to be repeated, is called the Multiplier.*

11. What is the answer called ?

ANS. *The result, or answer, is called the Product.*

12. 5 times 8 are 40 ; in this example which number is the multiplicand ? — the multiplier ? — the product ?

13. The multiplicand is 12, and the multiplier 5 ; what is the product ?

14. *What is the product* of 6 multiplied by 9 ? — of 9 multiplied by 6 ? — of 11 multiplied by 4 ? — of 8 multiplied by 8 ?

15. In each question in the last example, which number is the multiplicand ? — the multiplier ? — the product ?

16. *What is the product* of 7 times 5 ? — of 6 times 3 ?

17. *What is the product* of 5 times 9 ? — of 12 times 7 ? — of 7 times 12 ?

18. The multiplicand is 8, and the multiplier 11 ; what is the product ?

LESSON II.

1. What sign is used to denote multiplication, and what does it show ?

ANS. *Two short lines, crossing each other in the form of the letter X, are the sign of multiplication. When placed between numbers it shows that they are to be multiplied together ?*

2. What does $3 \times 4 = 12$ signify ?

ANS. *It signifies that 3 times 4 are equal to 12, or, 4 times 3 are equal to 12.*

3. What does $4 \times 2 \times 7 = 56$ signify ?

ANS. *It signifies that 4 multiplied by 2, and this product by 7, equals 56.*

4. You may now read $9 \times 5 = 45$. $8 \times 11 = 88$. $5 \times 4 \times 10 = 200$. $2 \times 2 \times 2 \times 2 = 16$.

5. How many are 5×0 ? — 7×0 ? — 10×0 ? — 0×0 ?

6. Before proceeding farther, you must commit perfectly to memory the following

MULTIPLICATION TABLE.

$2 \times 0 = 0$	$4 \times 10 = 40$	$7 \times 6 = 42$	$10 \times 3 = 30$
$2 \times 1 = 2$	$4 \times 11 = 44$	$7 \times 7 = 49$	$10 \times 4 = 40$
$2 \times 2 = 4$	$4 \times 12 = 48$	$7 \times 8 = 56$	$10 \times 5 = 50$
$2 \times 3 = 6$		$7 \times 9 = 63$	$10 \times 6 = 60$
$2 \times 4 = 8$	$5 \times 0 = 0$	$7 \times 10 = 70$	$10 \times 7 = 70$
$2 \times 5 = 10$	$5 \times 1 = 5$	$7 \times 11 = 77$	$10 \times 8 = 80$
$2 \times 6 = 12$	$5 \times 2 = 10$	$7 \times 12 = 84$	$10 \times 9 = 90$
$2 \times 7 = 14$	$5 \times 3 = 15$	$8 \times 0 = 0$	$10 \times 10 = 100$
$2 \times 8 = 16$	$5 \times 4 = 20$	$8 \times 1 = 8$	$10 \times 11 = 110$
$2 \times 9 = 18$	$5 \times 5 = 25$	$8 \times 2 = 16$	$10 \times 12 = 120$
$2 \times 10 = 20$	$5 \times 6 = 30$	$8 \times 3 = 24$	
$2 \times 11 = 22$	$5 \times 7 = 35$	$8 \times 4 = 32$	$11 \times 0 = 0$
$2 \times 12 = 24$	$5 \times 8 = 40$	$8 \times 5 = 40$	$11 \times 1 = 11$
	$5 \times 9 = 45$	$8 \times 6 = 48$	$11 \times 2 = 22$
$3 \times 0 = 0$	$5 \times 10 = 50$	$8 \times 7 = 56$	$11 \times 3 = 33$
$3 \times 1 = 3$	$5 \times 11 = 55$	$8 \times 8 = 64$	$11 \times 4 = 44$
$3 \times 2 = 6$	$5 \times 12 = 60$	$8 \times 9 = 72$	$11 \times 5 = 55$
$3 \times 3 = 9$		$8 \times 10 = 80$	$11 \times 6 = 66$
$3 \times 4 = 12$	$6 \times 0 = 0$	$8 \times 11 = 88$	$11 \times 7 = 77$
$3 \times 5 = 15$	$6 \times 1 = 6$	$8 \times 12 = 96$	$11 \times 8 = 88$
$3 \times 6 = 18$	$6 \times 2 = 12$		$11 \times 9 = 99$
$3 \times 7 = 21$	$6 \times 3 = 18$	$9 \times 0 = 0$	$11 \times 10 = 110$
$3 \times 8 = 24$	$6 \times 4 = 24$	$9 \times 1 = 9$	$11 \times 11 = 121$
$3 \times 9 = 27$	$6 \times 5 = 30$	$9 \times 2 = 18$	$11 \times 12 = 132$
$3 \times 10 = 30$	$6 \times 6 = 36$	$9 \times 3 = 27$	
$3 \times 11 = 33$	$6 \times 7 = 42$	$9 \times 4 = 36$	$12 \times 0 = 0$
$3 \times 12 = 36$	$6 \times 8 = 48$	$9 \times 5 = 45$	$12 \times 1 = 12$
	$6 \times 9 = 54$	$9 \times 6 = 54$	$12 \times 2 = 24$
$4 \times 0 = 0$	$6 \times 10 = 60$	$9 \times 7 = 63$	$12 \times 3 = 36$
$4 \times 1 = 4$	$6 \times 11 = 66$	$9 \times 8 = 72$	$12 \times 4 = 48$
$4 \times 2 = 8$	$6 \times 12 = 72$	$9 \times 9 = 81$	$12 \times 5 = 60$
$4 \times 3 = 12$		$9 \times 10 = 90$	$12 \times 6 = 72$
$4 \times 4 = 16$	$7 \times 0 = 0$	$9 \times 11 = 99$	$12 \times 7 = 84$
$4 \times 5 = 20$	$7 \times 1 = 7$	$9 \times 12 = 108$	$12 \times 8 = 96$
$4 \times 6 = 24$	$7 \times 2 = 14$		$12 \times 9 = 108$
$4 \times 7 = 28$	$7 \times 3 = 21$	$10 \times 0 = 0$	$12 \times 10 = 120$
$4 \times 8 = 32$	$7 \times 4 = 28$	$10 \times 1 = 10$	$12 \times 11 = 132$
$4 \times 9 = 36$	$7 \times 5 = 35$	$10 \times 2 = 20$	$12 \times 12 = 144$

7. *How many are* $9 \times 2?$ — $4 \times 6?$ — $3 \times 8?$ — $7 \times 12?$

8. *How many are* $5 \times 5?$ — $6 \times 6?$ — $2 \times 3 \times 4?$

9. *How many are* $3 \times 2 \times 8?$ — $5 \times 2 \times 7?$ — $4 \times 3 \times 5 \times 2?$ — $2 \times 1 \times 4 \times 3?$ — $3 \times 5 \times 2 \times 0?$

LESSON III.

1. How much will 8 barrels of flour come to, at 11 dollars a barrel?

2. How many days will it take one man to do as much work as 9 men can do in 10 days?

3. If it takes 10 yards of calico to make one dress, *how many yards will it take to make 8 dresses?* — to make 5 dresses? — to make 7 dresses?

4. In one peck are 8 quarts, *how many quarts in 7 pecks?* — in 4 pecks? — in 12 pecks?

5. A drover bought 11 cows, paying 12 dollars apiece for them; how much did they all cost him?

6. How many dollars will be required to give 10 men 12 dollars each?

7. There are 7 days in one week; *how many days in 2 weeks?* — in 5 weeks? — in 8 weeks?

8. How much will 12 melons cost, at 6 cents apiece? How much at 8 cents apiece?

9. If a barrel of flour will last 5 persons 9 weeks, how many weeks will it last one person?

10. A trunk-maker sold 11 trunks, at 8 dollars apiece; how many dollars did he receive for them?

11. How many trees in an orchard containing 9 rows of trees, with 12 trees in each row?

12. How much will 7 pounds of coffee cost, at 12 cents a pound? How much at 9 cents a pound?

13. *How many are* $11 \times 8?$ — $8 \times 10?$ — $11 \times 12?$ — $8 \times 7?$ — $4 \times 6?$ — $6 \times 9?$

14. How much will 4 acres of land cost, at 20 dollars an acre?

SOLUTION. 4 acres will cost 4 times as much as 1 acre; since 1 acre costs 20 dollars, 4 acres will cost 4 times 20

dollars; 4 times 2 tens = 8 tens or 80. Therefore, 4 acres of land, at 20 dollars an acre, will cost 80 dollars.

15. In one hour are 60 minutes; how many minutes in 3 hours?

16. A clerk sold 8 yards of calico, at 20 cents a yard; how much did it come to?

17. A dairy-man sold 30 pounds of cheese, at 7 cents a pound; how much did he receive for it?

18. Thomas read 40 pages in his library book in one day, and Andrew read 5 times as many pages in his; how many pages did Andrew read?

19. How much will 50 barrels of flour come to, at 4 dollars a barrel?

20. *How many are* $2 \text{ times } 2?$ — $2 \text{ times } 20?$ — $3 \times 2?$ — $3 \times 20?$ — $5 \times 2?$ — $5 \times 20?$ — $7 \times 20?$ — $8 \times 2?$ — $8 \times 20?$ — $10 \times 2?$ — $10 \times 20?$

LESSON IV.

1. How much will 7 acres of land cost, at 50 dollars an acre?

2. How much will 3 carriages come to, at 70 dollars apiece?

3. If 5 men can clear a certain piece of land in 40 days, how many men will it take to clear it in one day? How many days will it take one man to clear it?

4. A drover bought 6 horses, for which he paid 90 dollars each; how much did they all cost him?

5. A butcher bought 11 fat cattle, for which he paid 40 dollars each; how much did they cost him?

6. A man hired a horse 12 days, for 50 cents a day; how much must he pay for the whole time?

7. At 9 cents a pound, how much will 60 pounds of sugar come to?

8. *How many are* $2 \times 3?$ — $2 \times 30?$ — $4 \times 3?$ — $4 \times 30?$ — $7 \times 3?$ — $7 \times 30?$ — $8 \times 3?$ — $8 \times 30?$ — $9 \times 3?$ — $9 \times 30?$

9. *How many are* $3 \times 4?$ — $3 \times 40?$ — $7 \times 4?$ — $7 \times 40?$ — $8 \times 4?$ — $8 \times 40?$ — $10 \times 4?$ — $10 \times 40?$

10. *How many are* $4 \times 5?$ — $4 \times 50?$ — $6 \times 5?$ — $6 \times 50?$ — $8 \times 5?$ — $8 \times 50?$

11. *How many are* $2 \times 6?$ — $2 \times 60?$ — $5 \times 60?$ — $6 \times 6?$ — $6 \times 60?$ — $9 \times 6?$ — $9 \times 60?$ — $10 \times 6?$ — $10 \times 60?$

12. *How many are* $2 \times 7?$ — $2 \times 70?$ — $3 \times 7?$ — $3 \times 70?$ — $4 \times 7?$ — $4 \times 70?$ — $5 \times 7?$ — $5 \times 70?$ — $6 \times 7?$ — $6 \times 70?$ — $7 \times 7?$ — $7 \times 70?$ — $8 \times 7?$ — $8 \times 70?$ — $9 \times 7?$ — $9 \times 70?$ — $10 \times 7?$ — $10 \times 70?$

LESSON V.

1. *How many are* $2 \times 80?$ — $3 \times 80?$ — $4 \times 80?$ — $5 \times 80?$ — $6 \times 80?$ — $7 \times 80?$ — $8 \times 80?$ — $9 \times 80?$ — $10 \times 80?$

2. *How many are* $5 \times 9?$ — $5 \times 90?$ — $7 \times 9?$ — $7 \times 90?$ — $9 \times 9?$ — $9 \times 90?$

3. *How many are* $2 \times 10?$ — $2 \times 100?$ — $3 \times 10?$ — $3 \times 100?$ — $4 \times 10?$ — $4 \times 100?$ — $5 \times 10?$ — $5 \times 100?$ — $6 \times 10?$ — $6 \times 100?$ — $7 \times 10?$ — $7 \times 100?$ — $8 \times 10?$ — $8 \times 100?$ — $9 \times 10?$ — $9 \times 100?$ — $10 \times 10?$ — $10 \times 100?$

4. How much will 3 parlor stoves come to, at 13 dollars apiece?

SOLUTION. 3 stoves will cost 3 times as much as one stove; since one stove costs 13 dollars, 3 stoves will cost 3 times 13 dollars; 3 times 10 dollars = 30 dollars, 3 times 3 dollars = 9 dollars, and 30 dollars + 9 dollars = 39 dollars. Therefore, 3 parlor stoves, at 13 dollars apiece, will come to 39 dollars.

5. A man has 4 fields, containing 22 acres each; how many acres in all the fields?

6. James can earn 31 cents in one day; how much can he earn in one week, or 6 days?

7. How much will 2 yards of cloth cost, at 14 shillings a yard?

8. A man drove 43 sheep to market, and sold them for 3 dollars apiece; how much did he receive for them?

9. Multiply 21, 41, 71, and 91, by 2. Multiply each of them by 3. — by 5. — by 6. — by 8.

10. Multiply 12, 32, 52, 82, and 92, by 2. *Multiply each of them by 3. — by 4.*

11. Multiply 13, 23, 53, 63, and 93, by 2. *Multiply each of them by 3.*

12. Multiply 24, 34, 64, 74, and 84, by 2.

LESSON VI.

1. A man bought 8 cheeses, weighing 23 pounds each ; how much did they all weigh ?

SOLUTION. 8 cheeses weighed 8 times as much as one cheese ; since one cheese weighed 23 pounds, 8 cheeses weighed 8 times 23 pounds ; 8 times 2 tens = 16 tens or 160, 8 times 3 = 24, and $160 + 24 = 184$. Therefore, the weight of 8 cheeses, each weighing 23 pounds, was 184 pounds.

2. How much will 5 yards of broadcloth come to, at 24 shillings a yard ?

3. If the railroad fare be 3 cents a mile, how much will it be for 33 miles ? How much for 45 miles ?

4. How much will it cost for a horse to drive 36 miles, at 6 cents a mile ? *How much at 4 cents a mile ? — at 8 cents a mile ? — at 10 cents a mile ?*

5. How much will 49 cords of wood cost, at 3 dollars a cord ?

6. Multiply 22, 42, 72, and 92, by 5. *Multiply each of them by 6. — by 8.*

7. Multiply 13, 33, 53, 73, and 83, by 4. *Multiply each of them by 6. — by 8.*

8. Multiply 14, 44, 74, and 94, by 3. *Multiply each of them by 5. — by 7. — by 9.*

9. Multiply 25, 45, and 55, by 2. *Multiply each of them by 3. — by 6. — by 7. — by 9.*

10. Multiply 16, 46, 56, 86, and 96, by 2. *Multiply each of them by 5. — by 7. — by 9.*

11. Multiply 17, 27, 47, 67, and 77, by 2. *Multiply each of them by 5. — by 6. — by 9.*

12. Multiply 38, 48, 58, and 98, by 2. *Multiply each of them by 3. — by 5. — by 8.*

13. Multiply 19, 39, 49, 69, 79, and 99, by 2. *Multiply each of them by 3. — by 4. — by 5. — by 6. — by 7. — by 8. — by 9.*

LESSON VII.

1. A owns 23 acres of land, and B owns 5 times as many acres; how many acres does B own?

2. How much will 7 sets of chairs come to, at 15 dollars a set?

3. The price of a center table is 13 dollars, and the price of a sofa is 4 times as much; what is the price of a sofa?

4. If a man lays up 50 cents a day, *how much* will he lay up in 3 days? — in 5 days? — in one week, or 6 days?

5. How much will 8 yards of cloth cost, at 18 shillings a yard?

6. 12 pence make one shilling; *how many pence* in 13 shillings? — in 30 shillings?

7. A farmer sold 65 sheep, at 2 dollars apiece; how many dollars did he receive for them?

8. A tanner bought 4 hides, each weighing 37 pounds; what was their whole weight?

9. A certain farm consists of 5 lots of land, each lot containing 32 acres; how many acres in the farm?

10. A lady bought 16 yards of silk, for 9 shillings a yard; how many shillings did she pay for it?

11. A stationer sold 14 bunches of quills, at 9 cents a bunch; how much did he receive for them?

12. How many windows in this room? *How many panes of glass* in one window? — in all the windows?

13. How much will 21 tons of hay come to, at 10 dollars a ton? How much at 7 dollars a ton?

14. There are 24 hours in one day; *how many hours* in 2 days? — in 5 days? — in 8 days?

15. A merchant sold 6 pieces of sheeting, each piece containing 33 yards; how many yards did the 6 pieces contain?

16. Robert caught 5 black bass, and sold them for 13 cents apiece; how much did he receive for them?

17. If a woman can spin 36 knots of yarn in one day, how many knots can she spin in 3 days?

18. A fruit dealer sold 15 melons, at 6 cents apiece; *how much* did he receive for them?

19. Julius is learning to be a printer, and receives 7

dollars a month for his labor ; how much will he receive for 18 months' services ?

20. How much will 40 pounds of lard cost, at 6 cents a pound ?

21. A man bought 3 cows, at 15 dollars apiece, and 5 sheep, at 3 dollars apiece ; how many dollars did he expend ? How much more did he pay for the cows than for the sheep ?

22. If a man can walk 30 miles a day, *how far can he walk* in 2 days ? — in 3 days ? — in 6 days ?

23. What will be the cost of a cheese weighing 25 pounds, at 8 cents a pound ?

24. In one week are 7 days ; *how many days* in 20 weeks ? — in 35 weeks ?

25. A merchant sold to one man 24 yards of carpeting, at 4 shillings a yard, and to another man 20 yards, at 3 shillings a yard ; how many yards did he sell ? How many shillings did he receive ?

26. A grocer sold to one man 16 pounds of mackerel, to another man 11 pounds, and to another man 14 pounds, at 7 cents a pound ; how many pounds did he sell, and how much did he receive ?

DIVISION.

LESSON I.*

1. James had 12 apples, which he gave to 4 boys, giving to each boy an equal number ; how many apples did one boy receive ?

SOLUTION. *Since 4 boys received 12 apples, one boy received as many apples as the number of times 4 is contained in 12 ; 4 is contained in 12 three times. Therefore, one boy received 3 apples.*

2. Anson would give 12 apples to 3 boys ; how many must he give each boy ?

3. John, having 15 walnuts, gave them to his playmates, who received 3 walnuts each ; to how many did he give them ?

* See Note 12.

SOLUTION. *Since he gave 3 walnuts to one playmate, he gave 15 walnuts to as many playmates as the number of times 3 is contained in 15; 3 is contained in 15 five times. Therefore, he gave the walnuts to 5 playmates.*

4. If you had 20 cents, how many cakes could you buy, at 4 cents apiece? How many at 5 cents apiece?

5. How many yards of cloth can be bought for 30 dollars, at 5 dollars a yard?

6. If 10 oranges are worth 40 cents, how much is one orange worth?

7. A laborer received 42 shillings for 6 days' work; how many shillings was that for one day?

8. In the above examples, how have the answers been obtained?

Ans. *By finding how many times one of the two given numbers was contained in the other.*

9. When we find how many times one number is contained in another, what is the process called?

Ans. *It is called Division.*

10. Then, what is division?

Ans. *Division is the method of finding how many times one number is contained in another of the same kind. It is also the method of dividing a number into any number of equal parts.*

11. What is the number to be divided called?

Ans. *The number to be divided is called the Dividend.*

12. What is the number to divide by called?

Ans. *The number to divide by is called the Divisor.*

13. What is the answer called?

Ans. *The result, or answer, is called the Quotient.*

14. 8 is contained in 56 seven times; in this example, which number is the dividend? — the divisor? — the quotient?

15. The dividend is 45, and the divisor 5; what is the quotient?

16. What is the quotient of 54 divided by 9? — of 30 divided by 5?

17. Divide 18 by 6. — 18 by 3. — 18 by 9. — 18 by 2.

18. In each question in the last example, which number is the dividend? — the divisor? — the quotient?

19. What is the quotient of 70 divided by 10? — of 72 divided by 12? — of 48 divided by 8?

20. The dividend is 96, and the divisor 12; what is the quotient?

21. The divisor is 7, and the dividend 63; what is the quotient?

LESSON II.

1. What sign is used to denote division?

Ans. *A short horizontal line between two dots, \div , is the sign of division.*

2. What does it show?

Ans. *It shows that the number before it is to be divided by the number after it.*

3. What does $12 \div 3 = 4$ signify?

Ans. *It signifies that 12 divided by 3 is equal to 4.*

4. How is $27 \div 9 = 3$ read?

Ans. *27 divided by 9 is equal to 3; or, more commonly, 9 in 27 three times.*

5. You may now read $45 \div 9 = 5$. $77 \div 7 = 11$.
 $16 \div 8 = 2$. $60 \div 12 = 5$. $75 \div 15 = 5$.

6. $88 \div 11 =$ how many? $96 \div 8 =$ how many?

7. You must now adopt one of the forms of reading given in example 4, and commit perfectly to memory the following

DIVISION TABLE.

$2 \div 2 = 1$	$3 \div 3 = 1$	$4 \div 4 = 1$	$5 \div 5 = 1$
$4 \div 2 = 2$	$6 \div 3 = 2$	$8 \div 4 = 2$	$10 \div 5 = 2$
$6 \div 2 = 3$	$9 \div 3 = 3$	$12 \div 4 = 3$	$15 \div 5 = 3$
$8 \div 2 = 4$	$12 \div 3 = 4$	$16 \div 4 = 4$	$20 \div 5 = 4$
$10 \div 2 = 5$	$15 \div 3 = 5$	$20 \div 4 = 5$	$25 \div 5 = 5$
$12 \div 2 = 6$	$18 \div 3 = 6$	$24 \div 4 = 6$	$30 \div 5 = 6$
$14 \div 2 = 7$	$21 \div 3 = 7$	$28 \div 4 = 7$	$35 \div 5 = 7$
$16 \div 2 = 8$	$24 \div 3 = 8$	$32 \div 4 = 8$	$40 \div 5 = 8$
$18 \div 2 = 9$	$27 \div 3 = 9$	$36 \div 4 = 9$	$45 \div 5 = 9$
$20 \div 2 = 10$	$30 \div 3 = 10$	$40 \div 4 = 10$	$50 \div 5 = 10$
$22 \div 2 = 11$	$33 \div 3 = 11$	$44 \div 4 = 11$	$55 \div 5 = 11$
$24 \div 2 = 12$	$36 \div 3 = 12$	$48 \div 4 = 12$	$60 \div 5 = 12$

$6 \div 6 = 1$	$77 \div 7 = 11$	$72 \div 9 = 8$	$44 \div 11 = 4$
$12 \div 6 = 2$	$84 \div 7 = 12$	$81 \div 9 = 9$	$55 \div 11 = 5$
$18 \div 6 = 3$		$90 \div 9 = 10$	$66 \div 11 = 6$
$24 \div 6 = 4$	$8 \div 8 = 1$	$99 \div 9 = 11$	$77 \div 11 = 7$
$30 \div 6 = 5$	$16 \div 8 = 2$	$108 \div 9 = 12$	$88 \div 11 = 8$
$36 \div 6 = 6$	$24 \div 8 = 3$		$99 \div 11 = 9$
$42 \div 6 = 7$	$32 \div 8 = 4$	$10 \div 10 = 1$	$110 \div 11 = 10$
$48 \div 6 = 8$	$40 \div 8 = 5$	$20 \div 10 = 2$	$121 \div 11 = 11$
$54 \div 6 = 9$	$48 \div 8 = 6$	$30 \div 10 = 3$	$132 \div 11 = 12$
$60 \div 6 = 10$	$56 \div 8 = 7$	$40 \div 10 = 4$	
$66 \div 6 = 11$	$64 \div 8 = 8$	$50 \div 10 = 5$	$12 \div 12 = 1$
$72 \div 6 = 12$	$72 \div 8 = 9$	$60 \div 10 = 6$	$24 \div 12 = 2$
	$80 \div 8 = 10$	$70 \div 10 = 7$	$36 \div 12 = 3$
$7 \div 7 = 1$	$88 \div 8 = 11$	$80 \div 10 = 8$	$48 \div 12 = 4$
$14 \div 7 = 2$	$96 \div 8 = 12$	$90 \div 10 = 9$	$60 \div 12 = 5$
$21 \div 7 = 3$		$100 \div 10 = 10$	$72 \div 12 = 6$
$28 \div 7 = 4$	$9 \div 9 = 1$	$110 \div 10 = 11$	$84 \div 12 = 7$
$35 \div 7 = 5$	$18 \div 9 = 2$	$120 \div 10 = 12$	$96 \div 12 = 8$
$42 \div 7 = 6$	$27 \div 9 = 3$		$108 \div 12 = 9$
$49 \div 7 = 7$	$36 \div 9 = 4$		$120 \div 12 = 10$
$56 \div 7 = 8$	$45 \div 9 = 5$	$11 \div 11 = 1$	$132 \div 12 = 11$
$63 \div 7 = 9$	$54 \div 9 = 6$	$22 \div 11 = 2$	$144 \div 12 = 12$
$70 \div 7 = 10$	$63 \div 9 = 7$	$33 \div 11 = 3$	

8. How many are $54 \div 9$? — $99 \div 11$? — $32 \div 8$?

9. How many are $84 \div 12$? — $33 \div 11$? — $120 \div 10$?

LESSON III.*

1. A grocer paid 48 dollars for 6 barrels of fish; how much was that a barrel?

SOLUTION. Since 6 barrels cost 48 dollars, one barrel cost as many dollars as the number of times 6 is contained in 48; 6 is contained in 48 eight times. Therefore, the fish was 8 dollars a barrel.

2. How many bushels of clover seed can be bought for 35 dollars, at 5 dollars a bushel?

SOLUTION. Since 5 dollars will buy one bushel, 35 dollars will buy as many bushels as the number of times 5

* See Note 12.

dollars are contained in 35 dollars; $35 \div 5 = 7$. Therefore, 7 bushels of clover seed can be bought for 35 dollars, at 5 dollars a bushel.

3. A man has a piece of work, which will take him 40 days to perform alone; how many days will it take 8 men to perform the same work?

4. In how many days can 4 men perform as much work as 48 men can perform in one day?

5. In how many days can 3 men perform as much work as one man can perform in 24 days?

6. How many dresses can be made from 45 yards of gingham, allowing 9 yards to each dress?

7. A clerk sold 10 reams of paper for 40 dollars; how much was that a ream?

8. If a man can lay 3 courses of shingles, on the roof of a house, in one hour, how many hours will it take him to lay 30 courses?

9. How many pounds of sugar can be bought for 72 cents, at 9 cents a pound?

10. *How many are* $24 \div 8$? — $24 \div 6$? $24 \div 12$? — $24 \div 4$? — $24 \div 3$? — $24 \div 2$?

11. *How many are* $30 \div 10$? — $72 \div 12$? — $72 \div 9$? — $72 \div 8$? — $72 \div 6$?

12. A man sold 4 acres of land for 80 dollars; how much was that an acre?

SOLUTION. Since 4 acres came to 80 dollars, one acre came to as many dollars as the number of times 4 is contained in 80; 4 is contained in 8 tens 2 tens or 20 times. Therefore, one acre cost 20 dollars.

13. How many cords of wood can be bought for 60 dollars, at 3 dollars a cord?

14. A girl paid 90 cents for 3 yards of satin ribbon; how much was that a yard?

15. Albert paid 5 cents for 50 filberts; how many was that for one cent?

16. A steamboat sailed 120 miles in 6 hours; how many miles did it sail in one hour?

17. *How many are* $2 \div 2$? — $20 \div 2$? — $4 \div 2$? — $40 \div 2$? — $6 \div 2$? — $60 \div 2$? — $8 \div 2$? — $80 \div 2$? — $10 \div 2$? — $100 \div 2$?

18. *How many* $12 \div 2$? — $120 \div 2$? — $14 \div 2$? — $140 \div 2$? — $16 \div 2$? — $160 \div 2$? — $18 \div 2$? — $180 \div 2$? — $20 \div 2$? — $200 \div 2$?

dollars are contained in 35 dollars ; $35 \div 5 = 7$. Therefore, 7 bushels of clover seed can be bought for 35 dollars, at 5 dollars a bushel.

3. A man has a piece of work, which will take him 40 days to perform alone ; how many days will it take 8 men to perform the same work ?

4. In how many days can 4 men perform as much work as 48 men can perform in one day ?

5. In how many days can 3 men perform as much work as one man can perform in 24 days ?

6. How many dresses can be made from 45 yards of gingham, allowing 9 yards to each dress ?

7. A clerk sold 10 reams of paper for 40 dollars ; how much was that a ream ?

8. If a man can lay 3 courses of shingles, on the roof of a house, in one hour, how many hours will it take him to lay 30 courses ?

9. How many pounds of sugar can be bought for 72 cents, at 9 cents a pound ?

10. *How many are $24 \div 8$? — $24 \div 6$? $24 \div 12$? — $24 \div 4$? — $24 \div 3$? — $24 \div 2$?*

11. *How many are $30 \div 10$? — $72 \div 12$? — $72 \div 9$? — $72 \div 8$? — $72 \div 6$?*

12. A man sold 4 acres of land for 80 dollars ; how much was that an acre ?

SOLUTION. *Since 4 acres came to 80 dollars, one acre came to as many dollars as the number of times 4 is contained in 80 ; 4 is contained in 8 tens 2 tens or 20 times. Therefore, one acre cost 20 dollars.*

13. How many cords of wood can be bought for 60 dollars, at 3 dollars a cord ?

14. A girl paid 90 cents for 3 yards of satin ribbon ; how much was that a yard ?

15. Albert paid for 5 hours ; how many was that for one cent ?

A steam engine can travel 40 miles in 2 hours ; how many miles can it travel in 1 hour ?

How many times is 4 contained in 20 ?

$20 \div 4 = 5$

How many times is 5 contained in 20 ?

$20 \div 5 = 4$

5. How many times is 9 contained in 189? — in 279? — in 369? — in 549? — in 369? — in 819?
6. Divide 24, 64, 84, 124, and 184, by 2.
7. Divide 66, 126, 186, 246, and 276, by 3.
8. Divide 48, 168, 208, 328, and 368, by 4.
9. Divide 26, 126, 146, and 186, by 2.
10. Divide 69, 99, 189, 249, and 279, by 3.
11. Divide 28, 68, 108, 148, and 188, by 2.

LESSON VII.

1. How many pounds of cheese can be bought for 184 cents, at 8 cents a pound?

SOLUTION. Since 8 cents will buy one pound, 184 cents will buy as many pounds as the number of times 8 cents are contained in 184 cents; $184 = 16$ tens and 24 units; 8 is contained in 16 tens 2 tens or 20 times, and in 24 units 3 times, and $20 + 3 = 23$. Therefore, 23 pounds of cheese can be bought for 184 cents, at 8 cents a pound.

Remark. We must take the greatest number of tens in the given number that will exactly contain the divisor, and call the remaining tens and units so many units.

2. A man received 144 dollars for plows, at 6 dollars apiece; how many plows did he sell?

Remark. $144 = 12$ tens and 24 units.

3. How many miles can I ride for 135 cents, at 3 cents a mile? How many miles at 5 cents a mile?

Remark. $135 = 12$ tens and 15 units; or, 10 tens and 35 units.

4. How many months will it take a boy to earn 216 dollars, at 4 dollars a month? — at 6 dollars a month? — at 8 dollars a month? — at 9 dollars a month?

Remark. 20 tens $+ 16$ units $= 216$; 18 tens $+ 36$ units $= 216$; or, 16 tens $+ 56$ units $= 216$.

5. How many cords of wood can you buy for 196 dollars, at 2 dollars a cord? — at 7 dollars a cord?

6. A fishmonger received 288 cents for fish, at 6 cents a pound; how many pounds did he sell?

7. *How many times* is 5 contained in 110? — in 170?
— in 230? — in 410? — in 495?
 8. *How many times* is 6 contained in 102? — in 138?
— in 294? — in 372? — in 204? — in 540?
 9. *How many times* is 2 contained in 70? — in 134?
— in 98? — in 112? — in 150?
 10. *How many times* is 7 contained in 105? — in 364?
— in 168? — in 490? — in 644?
 11. *How many times* is 9 contained in 108? — in 216?
— in 738? — in 657? — in 144? — in 522?
 12. *How many times* is 4 contained in 64? — in 144?
— in 340? — in 256? — in 372?
 13. *How many times* is 3 contained in 117? — in 138?
— in 174? — in 45?
 14. *How many times* is 8 contained in 112? — in 176?
— in 528? — in 264? — in 792?
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LESSON VIII.

1. A man has 100 acres of land in 4 equal fields; how many acres in each field?
2. I paid 135 cents for 3 books; how much were they apiece?
3. Five equal pieces of cloth contain 175 yards; how many yards in each piece?
4. A man earned 42 dollars in 3 months; how much was that a month?
5. Seven boxes of raisins weigh 168 pounds; how much does one box weigh?
6. A wholesale grocer sold 9 hogsheads of molasses for 162 dollars; how much was that for one hogshead?
7. He sold 4 barrels of sugar for 56 dollars; how much was that for one barrel?
8. He sold 6 chests of tea for 252 dollars; how much was that for one chest?
9. A man paid 65 dollars for 5 loads of lumber; how much was that for one load?
10. How many yards of velvet can be bought for 165 dollars, at 3 dollars a yard?
11. Three men built a house for 450 dollars; how many

dollars did each man receive, the money being shared equally among them?

12. Horace had 198 chestnuts, and on measuring them, he found there were just 2 pints; how many chestnuts were there in one pint?

13. A mason used 516 bricks in building a chimney 6 feet high; how many bricks did he use to a foot?

14. A man drove his horse 80 miles, at the rate of 5 miles an hour; how many hours did it take him?

15. A drover paid 135 dollars for 3 fat cattle; how much were they apiece? He sold them for 210 dollars; how much did he get apiece for them? How much did he make on one of them? How much on all of them?

16. A man bought 2 horses for 63 dollars apiece, and spent 40 dollars in fitting them for market; how much did they cost him? He sold them for 220 dollars; how much did he make on them? How much did he get apiece for them? How much did he make on each horse?

17. A man has 96 days' work to perform; how many weeks will it take him, if he works 6 days each week? How many men must he employ to do the work in one week? How many weeks will it take 6 men to do the work?

MISCELLANEOUS EXERCISES.*

1. James had 9 cents, and his father gave him 16 more; how many cents had he then?

2. A man gave 12 dollars for a cow, and 20 dollars for 10 sheep; how many dollars did he pay out?

3. Frank gave 15 walnuts to one boy, 8 to another, and had 13 left; how many walnuts had he at first?

4. Albert gave 18 apples for a kite, 12 for a string, 8 for a ball, 5 for a club, 6 for a fish-line, and 10 for a pole; how many apples did he trade away?

5. Samuel bought a knife for 16 cents, a book for 14 cents, and some walnuts for 6 cents; how many cents did he pay out?

6. In a certain school the pupils are divided into 3 spelling classes; in the first spelling class are 15 pupils, in the second 11 pupils, and in the third 12 pupils; how many pupils in the school?

7. *How many are* $9 + 6 ? - 19 + 6 ? - 9 + 16 ? - 12 + 14 ? - 15 + 22 + 8 ? - 18 + 12 + 8 + 5 + 6 ?$

8. $16 + 13 + 4 + 6 + 10 + 20 =$ how many?

9. John bought a book for 25 cents, and a slate for 9 cents less than what he gave for the book; how much did the slate cost him?

10. A boy, having 39 cents, gave 16 cents to a beggar; how many cents had he left?

11. A man had 54 peach trees in his fruit orchard, but last year 20 of them were blown down; how many are now standing?

12. A boy, being asked his age, said that he was 25 years younger than his father, whose age was 33 years; how old was the boy?

13. Thomas had 34 marbles, but he has sold 16 of them; how many has he left?

14. Peter sold a cart for 45 cents, which was 15 cents more than he gave for it; how many cents did the cart cost him?

15. *How many are* $35 - 15 ? - 36 - 9 ?$

16. *How many are* $26 - 9 ? - 53 - 33 ? - 75 - 8 ?$

17. A boy bought a kite for 16 cents; he gave 10 cents for a string, and then sold the whole for 26 cents; did he gain or lose, and how much?

18. A man bought 14 sheep of one man, 12 of another, and 20 of another, and afterwards sold 32 of them; how many sheep had he left?

19. Jane, having 50 cents, gave 6 cents for a thimble, and 14 cents for some cambric; how many cents had she left?

20. A merchant sold, from a piece of cloth containing 42 yards, 12 yards to one person, 8 yards to another, and 6 yards to another; how many yards were left in the piece?

21. A man borrowed 75 dollars, and paid at one time 14 dollars, at another time 12 dollars, at another time 10

dollars, and at another time 11 dollars; how many dollars did he then owe?

22. A man, having 24 miles to travel, traveled 8 miles in one hour, 6 miles the next, 5 miles the next, and the remainder of the distance the next hour; how many miles did he travel the last hour?

23. $16 + 8$ from 26 leaves how many?

24. The minuend is 30, and the subtrahend 20; what is the remainder?

25. $14 + 12 + 10 - 25 =$ how many?

26. $12 + 8 + 6$ and how many make 40?

27. $14 + 12 + 10 + 8 +$ how many $= 50$?

28. $27 - 9 + 3 + 8 + 12 + 5 - 30 =$ how many?

29. If one yard of ribbon costs 9 cents, how much will 6 yards cost? How much will 11 yards cost?

30. How much will 8 pounds of lard cost, at 9 cents a pound? How much at 7 cents a pound?

31. If a horse can travel 7 miles an hour, how far can he travel in 9 hours? How far in 20 hours?

32. How much will 9 tons of hay come to, at 9 dollars a ton? *How much* at 10 dollars a ton? — at 15 dollars?

33. If a blacksmith can shoe 8 horses in a day, how many can he shoe in a week?

34. A man had 14 teeth inserted on gold plate, at 4 dollars each; how much did they cost him?

35. *How many* are 9×6 ? — 9×16 ? — 6×19 ? — 8×17 ? — 4×20 ? — 5×32 ? — 3×45 ?

36. 81 are how many times 9? How many times 3? 54 are how many times 9? *How many times* 6? — 3?

37. How many times 8 make 48? How many times 9 make 108?

38. A man bought 3 pounds of raisins, at 11 cents a pound, and 2 papers of carpet tacks, at 9 cents a paper; how much did he trade?

39. *What is the difference* between 9 times 8, and 6 times 12? — between 4×6 , and 2×12 ?

40. Gilbert, having 50 cents, bought 2 primers, at 6 cents apiece, 3 steel pens, at 2 cents apiece, a slate for 10 cents, and a spelling book for 12 cents; how many cents had he left?

41. A lady bought six yards of calico, at 15 cents a yard; how much did it cost her? Not being suited with

it, she sold it to her servant girl for 11 cents a yard; how much did she get for it? How much did she lose on the whole? How much on one yard?

42. Two men start from Buffalo, at the same time, and travel east, one at the rate of 7 miles an hour, the other at the rate of 4 miles an hour; *how far apart* will they be in one hour? — in 10 hours? — in 6 days, if they travel 10 hours each day?

43. Seven boys gave a beggar 9 cents each; he paid 10 cents of the money for bread, and 12 cents for a lodging; how many cents had he left?

44. $9 \times 8 + 12 + 8 =$ how many?

45. $2 \times 6 + 3 \times 10 + 12$ and how many make 60?

46. $3 \times 20 + 5 \times 3$ and how many $= 10 \times 10$?

47. $7 \times 12 + 6 + 10$ and how many $= 8 \times 25$?

48. $10 + 32 +$ how many $= 5 \times 12$?

49. If you have 20 apples to give to 4 boys, how many can you give them apiece?

50. How many sheep can I buy for 24 dollars, at 2 dollars apiece?

51. How long will it take a ship to sail 98 miles, at the rate of 7 miles an hour?

52. How many pounds of pork, at 6 cents a pound, can be bought for 96 cents?

53. If one man can build a certain wall in 100 days, *in how many days* can 2 men build it? — 4 men? — 5 men?

54. A miller received 144 dollars for flour, at 8 dollars a barrel; how many barrels did he sell?

55. 6×4 and $2 \times 8 =$ how many times 5?

56. $2 \times 15 =$ how many times 6? *How many times* 5? — 3? — 10?

57. $3 \times 40 =$ how many times 12? How many times 10?

58. $55 + 12 + 10 =$ how many times 7?

59. $80 - 8 =$ how many times 6? How many times 8?

60. 5×8 and $2 \times 10 =$ how many times 12? *How many times* 10? — 6? — 5?

61. 7×8 and how many $= 6 \times 12$?

62. 6×12 and $3 \times 6 =$ how many times 10?

63. Six men bought a horse for 100 dollars, and sold him again for 76 dollars; how much did they lose by the bargain? *How much* did one man lose? — 3 men?

64. A man sold 6 cords of wood, at 12 shillings a cord, and received in payment 7 yards of cloth, at 9 shillings a yard, and the rest in money; how much money did he receive?

65. Daniel, having 40 cents, gave 28 of them for walnuts, at 4 cents a quart; how many quarts of walnuts did he buy? How many cents had he left?

66. A girl, having 23 peaches, kept 9 of them, and divided the remainder equally between her 2 playmates; how many did she give to each?

67. A man had 6 cows worth 10 dollars each, 5 worth 12 dollars each, and 7 worth 15 dollars each; how many cows had he?

68. A man borrowed 6 ten dollar bills, and 5 one dollar bills, and paid at one time 4 ten dollar bills, and 3 one dollar bills; how many ten dollar bills and one dollar bills did he then owe?

69. $84 - 66 =$ how many times 6?

70. 7×6 and how many $= 6 \times 9$?

71. $30 - 4 \times 5 =$ how many times 2?

72. $3 \times 7 - 2 \times 8 =$ how many?

73. $6 \times 8 - 3 \times 12 =$ how many times 4? $7 \times 12 - 11 \times 5 =$ how many times 2?

74. $6 \times 10 + 5$ minus $4 \times 10 + 3 = 4 \times 4 +$ how many?

75. $96 - 82 =$ how many times 2?

76. $24 - 3 \times 5 =$ how many times 9? $- 3$?

77. $22 - 2 \times 7 =$ how many times 8? $- 2$?

78. $6 \times 9 - 5 \times 7 =$ how many?

79. $5 \times 9 - 3 \times 11 = 7 +$ how many?

80. A boy bought a set of wagon wheels for 25 cents. He gave 7 cents to have them painted, and 14 cents to have some tires put on them, and then sold them for 60 cents; did he gain or lose, and how much?

81. A man wishes to drive a large ox 120 miles in 10 days, driving him only 6 hours a day; how many miles must he drive him in a day? — in an hour?

82. A merchant tailor sold 2 coats for 12 dollars apiece, 2 pairs of pantaloons for 10 dollars, and 3 vests for 8 dollars; he received in part payment 3 ten dollar bills and 5 one dollar bills; how much is yet his due?

83. A gentleman, being asked his age, said he was 17

years old when he entered college, he remained in college 4 years, spent 3 years in the study of law, practised his profession 16 years, and it was 5 years since he retired from business; what was his age? *How old was he* when he left college? — when he commenced the practice of law? — when he retired from business?

84. A thief, having 24 miles the start of the officer, continues his flight at the rate of 6 miles an hour; the officer presses on after him at the rate of 8 miles an hour; *how much* does he gain in one hour? — in 7 hours? How many hours before he will overtake the thief?

85. $25 + 12 +$ how many $= 3 \times 16$?

86. *How many times* is 10 contained in 120? — in 170? — in 140? — in 190?

87. $2 \times 12 + 10 + 8 = 3 \times 10 + 5 +$ how many?

88. $18 + 26 + 4 - 16 =$ *how many times* 8? — 4?

89. $17 + 4 + 3 + 16 + 5 =$ *how many times* 9? — 5? — 3?

90. How many times is $8 - 6$ contained in $24 + 10$?

91. $60 \div 5$ is how much more than 5 times $12 \div 6$?

92. $8 \times 12 - 9 \times 9 =$ *how many times* 3? — 5?

93. $6 \times 60 - 4 \times 50 =$ *how many times* 8? *How many times* 4? — 2? — 10?

FRACTIONS.

LESSON I.*

1. If I should divide any thing, as this apple, or this orange, into two equal parts, what would one of the parts be called?

ANS. *It would be called one half.*

2. Then, what do you understand by one half of any thing, or number?

ANS. *If any thing, or number, be divided into two equal parts, one of the parts is called one half of the thing or the number.*

3. How many halves make a whole one?

4. A boy divided two apples into halves; how many halves were there?

SOLUTION. *In 2 apples there are twice as many halves*

* See Note 13.

as there are in one apple ; since there are 2 halves in one apple, in 2 apples there are 2 times 2 halves, which are 4 halves. Therefore, in 2 apples there are 4 halves.

5. *How many halves in 3 oranges ? — in 4 oranges ?*

6. A man divided 5 pears among some boys, giving them one half of a pear each ; how many boys were there ?

7. Among how many men can I divide 6 dollars, if I give them one-half of a dollar apiece ?

8. A farmer paid 7 dollars for cloth, at one half dollar a yard ; how many yards did he buy ?

9. A boy received 8 cents for old iron, at one half cent a pound ; how many pounds did he sell ?

10. *How many halves in 5 ? — in 9 ? — in 10 ? — in 15 ? — in 20 ? — in 18 ? — in 12 ? — in 17 ? — in 11 ?*

11. If I divide this apple into three equal parts, what will one of the parts be called ?

Ans. *It will be called one third, and 2 of the parts will be called two thirds.*

12. Then, what is one third of any thing, or number ?

Ans. *If any thing, or number, be divided into three equal parts, one of the parts is called one third of the thing, or number, and two parts are called two thirds.*

13. How many thirds make a whole one ?

14. George divided an orange equally between his three brothers ; what part of an orange did he give to each ?

15. *How many thirds in 2 ? — in 5 ? — in 12 ? — in 8 ? — in 11 ? — in 4 ? — in 7 ? — in 9 ?*

16. If a board be cut into 4 equal pieces, what part of the board will one piece be ?

Ans. *One fourth, or one quarter.*

17. Then, what is one fourth or one quarter of any thing, or number ? How many fourths make a whole one ?

18. If a melon be divided into 4 equal parts, what part of the melon will one of the parts be ? Two of the parts ? Three of the parts ?

19. What is the difference between one fourth of any thing, and one quarter of it ?

20. *How many fourths in 3 yards ? — in 8 yards ?*

21. *How many quarters in 4 pounds ? — in 15 pounds ?*

22. If any thing, or number, be divided into any number of equal parts, what are the parts called ?

Ans. If any thing, or number, be divided into 5 equal parts, one of the parts is called one fifth; two parts are called two fifths; three parts, three fifths; &c. If divided into 6 equal parts, the parts are called sixths. If divided into 7 equal parts, the parts are called sevenths. If divided into 8 equal parts, the parts are called eighths; if into 9 equal parts, ninths; if into 10 equal parts, tenths; if into 11 equal parts, elevenths; if into 12 equal parts, twelfths; and so on, of any number of equal parts.

23. If a thing, or number, be divided into 5 equal parts, what will one of the parts be called? — 2 of the parts? — 4 of the parts? How many fifths make a whole one?

24. What do you understand by 2 sixths of a thing, or number?

Ans. I understand that a thing, or number, has been divided into six equal parts, and then two of those parts taken.

25. What do you understand by 3 sixths of a thing, or number? By 5 sixths? How many sixths make a whole one?

26. What do you understand by 2 sevenths of a mile? By 3 sevenths? By 5 sevenths? By 6 sevenths?

27. How many sevenths make a whole one?

28. What is meant by 2 eighths of a pound? By 4 eighths? By 7 eighths? How many eighths make a whole one?

29. What is meant by 2 ninths of a rod? By 5 ninths? By 8 ninths?

30. What does 1 tenth of a dollar mean? 2 tenths of a dollar? 3 tenths? 7 tenths? 9 tenths?

31. Explain the meaning of 1 eleventh of an acre? 8 elevenths? 5 twelfths? 9 twelfths?

32. How many ninths make a whole one? How many tenths? How many elevenths? How many twelfths?

LESSON II.

1. If you wished to measure out 3 eighths of a bushel of clover seed, how could you do it?

Ans. I could first divide a bushel into 8 equal parts, and then 3 of the parts would be 3 eighths of a bushel.

2. How can you obtain 2 fifths of any thing or number ? 4 sevenths ? 9 fifteenths ? 7 twentieths ?

3. How may 5 sevenths of an acre of land be measured off from a field containing 1 acre ? How 4 ninths of an acre ? How 11 fourteenths of an acre ?

4. What part of 2 is 1 ?

SOLUTION. *If 2 be divided into 2 equal parts, the quotient, or one of the parts, will be 1 ; and when any number is divided into 2 equal parts, one of those parts is called 1 half. Therefore, 1 is 1 half of 2.*

5. What part of 3 is 1 ? Is 2 ?

6. What part of 4 is 1 ? Is 2 ? Is 3 ?

7. If you divide 5 apples into 5 equal parts, how many apples will one of the parts contain ? 3 of the parts ?

8. Then, what part of 5 apples is 1 apple ? Are 2 apples ? — 3 apples ? — 4 apples ?

9. What part of 6 cents is 1 cent ? Are 5 cents ?

10. What part of seven days is one day ? Are 4 days ?

11. What part of 8 shillings is 1 shilling ? Are 3 shillings ? — 4 shillings ? — 7 shillings ?

12. What part of 9 miles is 1 mile ? Are 2 miles ? — 7 miles ? — 5 miles ?

13. What part of 10 dimes is 1 dime ? Are 7 dimes ?

14. What part of 1 foot, or 12 inches, is 1 inch ? Are 5 inches ? — 3 inches ? — 11 inches ? — 8 inches ?

15. What part of 18 is 1 ? Is 11 ? — 5 ? — 9 ? — 17 ?

16. What part of 25 is 14 ? Is 5 ? — 6 ? — 20 ? — 15 ?

17. What part of 50 is 3 ? Is 9 ? — 1 ? — 18 ? — 45 ?

18. What part of 67 is 1 ? Is 2 ? — 9 ? — 36 ? — 64 ?

19. 1 is what part of 2 ? What part of 3 ? — of 4 ? — of 20 ? — of 18 ? — of 34 ? — of 8 ? — of 12 ?

20. 2 is what part of 10 ? What part of 11 ? — of 14 ?

21. 5 is what part of 20 ? What part of 10 ? — of 50 ? — of 30 ? — of 40 ? — of 90 ? — of 100 ? — of 80 ?

22. How many tenths make a whole one ? How many twentieths ? — fifteenths ? — twenty-sevenths ?

23. In 5 whole ones how many fourths ? How many twelfths ? — ninths ? — sixteenths ?

24. In 8 barrels of flour how many thirds of a barrel ? How many fifths of a barrel ? — eighths ?

25. How many twelfths of a shilling in 4 shillings ? — in 7 shillings ? — in 12 shillings ?

26. In 1 pound are 16 ounces ; what part of a pound is 1 ounce ? *What part of a pound are 2 ounces ? — 8 ounces ? — 10 ounces ? — 7 ounces ? — 15 ounces ?*

LESSON III.*

1. How do you find one half of a thing, or number ?

Ans. *If any thing, or number, be divided into 2 equal parts, one of those parts will be one half of the thing, or number. Therefore, to find one half of any thing, or number, divide it by 2.*

2. A man, having 20 acres of land, sowed 1 half of it to wheat ; how many acres did he sow ?

3. *How much is 1 half of 6 hours ? — of 8 minutes ? — of 12 cents ? — 36 sheets of paper ? — of 100 men ?*

4. How do you find one third of a thing, or number ?

5. Three men bought a piece of cloth containing 36 yards, each man paying an equal share of the cost ; how many yards will one man have ?

SOLUTION. *One man will have 1 third as many yards as 3 men ; since 3 men have 36 yards, 1 man will have 1 third of 36 yards, which is 12 yards. Therefore, 1 man will have 12 yards.*

6. If 3 barrels of flour cost 21 dollars, how much will 1 barrel cost ?

7. *How much is 1 third of 24 ? — of 9 ? — of 15 ? — of 30 ? — of 33 ? — of 27 ? — of 48 ?*

8. *How do you find 1 fourth of a thing, or number ? — 1 fifth ? — 1 sixth ? — 1 seventh ? — 1 ninth ? — 1 twelfth ? — 1 twentieth ? — 1 fifteenth ? — 1 hundredth ?*

9. *What is 1 fourth of 16 bushels ? — of 32 quarts ? — of 24 inches ? — of 48 yards ? — of 60 minutes ?*

10. A man, having 30 sheep, sold 1 fifth of them ; how many sheep did he sell ?

11. *What is 1 fifth of 45 ? — of 25 ? — of 100 ?*

12. A man, having 30 miles to travel, traveled 1 sixth of the distance in an hour ; how many miles was that ?

13. *What is 1 sixth of 36 ? — of 12 ? — of 42 ?*

14. Seven men built a barn for 70 dollars, and each man

* See Note 14.

had $\frac{1}{7}$ of the money; how many dollars was that apiece?

15. *What is $\frac{1}{7}$ of 42? — of 35? — of 63?*

16. A lady, having 48 dollars, paid $\frac{1}{8}$ of her money for a muff; how much did the muff cost her?

17. *How much is $\frac{1}{8}$ of 32? — of 64? — of 72?*

18. A man chopped $\frac{1}{9}$ of 27 cords of wood in 1 day; how many cords was that?

19. *How much is $\frac{1}{9}$ of 54? — of 18? — of 63?*

20. A boy, having 100 cents, gave $\frac{1}{10}$ of his money for a pound of raisins; how much did they cost him?

21. *How much is $\frac{1}{10}$ of 40? — of 10? — of 120?*

22. A man used $\frac{1}{11}$ of 77 feet of boards in making a box; how many feet of boards did he use?

23. *How much is $\frac{1}{11}$ of 22? — of 121?*

24. Marcus, having 48 apples, gave $\frac{1}{12}$ of them for an orange; how many apples did the orange cost him?

25. *How much is $\frac{1}{12}$ of 24? — of 60? — of 144?*

LESSON IV.

1. If an apple be divided equally between 2 boys, what part of the apple will one boy receive?

SOLUTION. In a whole apple are 2 halves; one boy will receive 1 half as much as two boys; if 2 boys receive 2 halves, 1 boy will receive 1 half of 2 halves, which is 1 half. Therefore, one boy will receive 1 half of the apple.

2. If a dollar be equally divided among 3 men, what part of a dollar will one man have? What part will 2 men have?

SOLUTION. Two men will have 2 times as much as one man; if one man have $\frac{1}{3}$ of a dollar, 2 men will have 2 times $\frac{1}{3}$ of a dollar, which are two thirds of a dollar. Therefore, 2 men will have 2 thirds of a dollar.

3. If an acre of land be divided into 4 equal pieces, what part of one acre will one piece contain? — 3 pieces?

4. A man performed a piece of work in 5 days; what part of it did he perform in one day? — in 3 days?

5. Six boys hoed an acre of corn; what part of an acre did one boy hoe? Did 3 boys? — 4 boys?

6. Seven men bought a barrel of flour, each man paying an equal share; for what part of a barrel did one man pay? *Did 2 men? — 5 men? — 6 men?*

7. A man paid 1 dollar for 8 books; what part of a dollar did one book cost? *Did 2 books? — 5 books?*

8. Twelve men built a steamboat, each man doing an equal share of the work; what part of the work did one man do? *Did 5 men? — 9 men? — 11 men?*

9. James divided 28 apples equally between 3 boys; how many did he give to each?

SOLUTION. *Since 3 boys received 28 apples, one boy received as many apples as the number of times 3 is contained in 28; 3 is contained in 28 nine times and one over; in order to divide this remaining apple among the 3 boys, he cut it into 3 equal pieces, and gave one piece to each. Therefore, he gave each boy 9 apples and 1 third of an apple.*

10. A man paid 5 dollars for 2 sheep; how much were they apiece? How much for 3 of them?

SOLUTION. *One sheep cost 1 half as much as 2 sheep; since 2 sheep cost 5 dollars, 1 sheep cost 1 half of five dollars, which is 2 dollars and 1 half of a dollar. Therefore, the sheep cost 2 and 1 half dollars apiece.*

11. *How many times is 2 contained in 3? — in 5? — in 7? — in 10? — in 15? — in 21? — in 24?*

12. *How many times is 3 contained in 4? — in 7? — in 12? — in 13? — in 22? — in 25? — in 31?*

13. *How many times is 4 contained in 13? — in 21? — in 24? — in 37? — in 61?*

14. How many times is 5 contained in 12?

Ans. *Two times and 2 fifths of a time.*

15. *How many times is 5 contained in 8? — in 24? — in 36? — in 49? — in 70? — in 83?*

16. *How many times is 6 contained in 20? — in 18? — in 71? — in 35? — in 43? — in 52? — in 77?*

17. *How many times is 7 contained in 34? — in 81? — in 13? — in 53? — in 60? — in 100?*

18. Eighteen are how many times 5?

SOLUTION. *Eighteen are as many times 5 as the number of times 5 is contained in 18; 5 is contained in 18 three times and 3 fifths of a time. Therefore, 18 is 3 times 5 and 3 fifths of 5.*

19. *Twenty-two are how many times* $7? - 4? - 5?$
 $9? - 11? - 2? - 8? - 3? - 10? - 6? - 12?$
20. *Thirty are how many times* $10? - 3? - 4? - 7?$
 $- 5? - 6? - 8? - 2? - 9? - 11? - 12?$
-

LESSON V.

1. *Nineteen are how many times* $2? - 3? - 4? - 5? - 6? - 7? - 8? - 9? - 10? - 11? - 12?$
 2. *Forty-seven are how many times* $12? - 10? - 8? - 6? - 4? - 2? - 3? - 5? - 7? - 11? - 9?$
 3. *Fifty are how many times* $10? - 5? - 7? - 12? - 3? - 8? - 6? - 4? - 2? - 11? - 9?$
 4. *Eighty-four are how many times* $7? - 12? - 5? - 6? - 2? - 3? - 4? - 8? - 11? - 9? - 10?$
 5. *Twenty-eight are how many times* $4? - 7? - 2? - 3? - 9? - 5? - 11? - 6?$
 6. *Sixty-five are how many times* $5? - 10? - 12? - 6? - 3? - 8? - 9? - 7? - 4? - 11?$
 7. *Ninety are how many times* $9? - 6? - 12? - 10? - 7? - 11? - 4? - 8? - 3?$
 8. *Thirty-one are how many times* $3? - 2? - 4? - 6? - 5? - 8? - 7? - 10? - 12? - 9? - 11?$
 9. *Seventy-two are how many times* $12? - 9? - 10? - 11? - 6? - 7? - 8? - 3? - 4? - 5?$
 10. *Fifty-seven are how many times* $11? - 8? - 5? - 2? - 4? - 6? - 9? - 12?$
 11. *Ninety-six are how many times* $8? - 12? - 6? - 9? - 11? - 10? - 7? - 5?$
 12. *One hundred are how many times* $2? - 3? - 4? - 5? - 6? - 7? - 8? - 9? - 10? - 11? - 12?$
-

LESSON VI.

1. When any thing, or number, is divided into any number of equal parts, as halves, thirds, fifths, eighths, &c., what are the parts called?

Ans. They are called Fractions.

2. Then, what are fractions ?

ANS. *When any whole thing is divided or broken into any number of equal parts, the parts are called fractions, or broken numbers.*

3. What distinction do you make between whole numbers and fractions ?

ANS. *Whole numbers always express whole, unbroken, or undivided things ; fractions express parts of a broken, or divided thing, or number.*

4. How are fractions commonly expressed ?

ANS. *By two numbers, one above the other, with a horizontal line between them ; thus, $\frac{1}{2}$, 1 half ; $\frac{3}{5}$, 3 fifths.*

5. How are $\frac{1}{2}$, $\frac{3}{5}$, $\frac{4}{9}$, read ?

ANS. *$\frac{1}{2}$ is read one half ; $\frac{3}{5}$ three fifths ; $\frac{4}{9}$ four ninths.*

6. In what order are the numbers read ?

ANS. *The upper number first, and the lower one last.*

7. What is the number below the line called ?

ANS. *It is called the Denominator, because it gives the name to the parts.*

8. What is the number above the line called ?

ANS. *It is called the Numerator, because it numbers the parts.*

9. You may now read $\frac{1}{2}$, $\frac{3}{5}$, $\frac{4}{9}$, $\frac{2}{12}$, $\frac{3}{8}$, $\frac{1}{4}$, $\frac{5}{6}$, $\frac{7}{11}$, $\frac{2}{3}$, $\frac{6}{10}$, $\frac{8}{15}$, $\frac{9}{25}$, $\frac{20}{44}$, $\frac{18}{50}$, $\frac{75}{100}$.

10. Which is the numerator of each fraction in the last question ? Which is the denominator ?

11. What does the denominator of a fraction show ?

ANS. *It shows into how many equal parts a thing or unit is divided.*

12. What does the numerator show ?

ANS. *It shows how many of these parts are contained in the fraction.*

13. In the fraction $\frac{3}{8}$, what does the denominator show ? The numerator ?

ANS. *The denominator, 8, shows that the unit or whole thing is divided into 8 equal parts ; and the numerator, 3, shows that 3 of these parts are contained in the fraction.*

14. Which numbers the parts ? Which gives them their name or size ?

ANS. *The numerator numbers the parts ; the denominator gives them their name, and shows their size.*

15. What do you understand by $\frac{3}{4}$ of an apple ?

16. Explain the meaning of $\frac{2}{3}$ of a dollar. — of $\frac{1}{2}$ of a pound. — of $\frac{7}{10}$ of a month. — of $\frac{1}{5}$ of a mile. — of $\frac{2}{10}$ of an acre. — of $\frac{1}{12}$ of a foot. — of $\frac{1}{8}$ of a barrel of flour. — of $\frac{1}{15}$ of a hogshead of molasses.

17. What is meant by the terms of a fraction?

Ans. *The numerator and denominator, taken together, are called the terms of the fraction.*

18. What are the terms of the fraction $\frac{2}{3}$? — $\frac{2}{10}$? — $\frac{12}{10}$? — $\frac{1}{4}$? — $\frac{7}{8}$? — $\frac{2}{10}$? — $\frac{19}{100}$?

LESSON VII.*

1. From what do fractions always arise?

Ans. *Fractions always arise from division.*

2. In what manner?

Ans. *When any thing or number is to be divided, if the parts cannot all be whole ones, one or more of the units in the dividend must be divided or broken into parts, and these divided or broken parts form fractions.*

3. How may any division be expressed in the form of a fraction?

Ans. *By writing the dividend for the numerator of a fraction, and the divisor for the denominator.*

4. What may the numerator of a fraction always be considered? The denominator?

Ans. *The numerator of a fraction may always be considered a dividend, or a number to be divided; and the denominator may always be considered a divisor.*

5. What then is the value of a fraction?

Ans. *The value of a fraction is the quotient of the numerator divided by the denominator.*

6. Of what is the fraction $\frac{1}{4}$ the quotient?

Ans. *The fraction $\frac{1}{4}$ is the quotient of 1 divided by 4.*

7. Of what is $\frac{2}{5}$ the quotient? — $\frac{1}{6}$? — $\frac{4}{5}$? — $\frac{5}{8}$? — $\frac{2}{7}$? — $\frac{3}{9}$? — $\frac{1}{11}$? — $\frac{2}{15}$?

8. Which number is the dividend, and which the divisor, in the fraction $\frac{7}{8}$? — $\frac{4}{5}$? — $\frac{3}{7}$? — $\frac{1}{10}$? — $\frac{2}{18}$?

9. If 4 oranges be equally divided among 6 boys, what part of an orange will one boy have?

* See Note 15.

SOLUTION. *One boy will have 1 sixth as much as 6 boys ; if 6 boys have 4 oranges, 1 boy will have 1 sixth of 4 oranges, which is $\frac{2}{3}$ of 1 orange. . Therefore, 1 boy will have $\frac{2}{3}$ of an orange.*

10. If 3 apples be equally divided among 5 girls, what part of an apple will 1 girl have ?

11. A man paid 4 dollars for 5 bushels of wheat ; how much was that a bushel ?

12. A bird can fly 2 miles in 3 minutes ; how far can it fly in 1 minute ?

13. A father divided 3 shillings equally among his 4 children ; what part of a shilling did 1 child have ?

14. If a barrel of flour be divided equally among 7 men, what part of a barrel will each man have ? If 2 barrels be divided, what part of a barrel will each man have ? If 5 barrels, what ? If 7 barrels, what ?

15. A laborer earned 7 dollars in 8 days ; how much was that a day ?

16. A woman carried 9 geese to market, and sold them all for 5 dollars ; how much did she get apiece for them ?

17. If 10 pounds of tea cost 7 dollars, how much will 1 pound cost ?

18. A man performed 8 days' labor in 11 days ; what part of a day's labor did he perform in 1 day ?

19. *What is the quotient* of 1 divided by 3 ? — of 2 divided by 3 ? — of $1 \div 4$? — of $2 \div 4$? — of $3 \div 4$?

20. *What is the quotient* of $1 \div 5$? — of $3 \div 5$? — of $2 \div 6$? — of $3 \div 6$? — of $5 \div 6$?

21. *What is the quotient* of $5 \div 7$? — of $2 \div 7$? — of $6 \div 8$? — of $3 \div 8$? — of $7 \div 8$? — of $1 \div 8$?

22. *What is the quotient* of $3 \div 9$? — of $1 \div 9$? — of $4 \div 11$? — of $8 \div 15$? — of $13 \div 20$?

23. *What part of 1 orange is $\frac{1}{2}$ part of 2 oranges ? — $\frac{1}{3}$ of 3 oranges ? — $\frac{1}{4}$ of 5 oranges ?*

24. *What part of 1 is $\frac{1}{2}$ of 4 ? — $\frac{1}{3}$ of 2 ? — $\frac{1}{4}$ of 5 ? — $\frac{1}{5}$ of 3 ? — $\frac{1}{6}$ of 9 ? — $\frac{1}{7}$ of 16 ?*

LESSON VIII.

1. When the numerator of a fraction is less than the denominator, what is the fraction called ?

Ans. *It is called a Proper Fraction, because its value is less than a unit.*

2. When the numerator is equal to, or exceeds the denominator, what is the fraction called?

Ans. *It is called an Improper Fraction, because it is equal to, or exceeds a unit.*

3. When a whole number and a fraction are used together, to express one number, what is the number called?

Ans. *It is called a Mixed Number, because it consists of a whole number and a fraction.*

4. How are $3\frac{1}{2}$, $5\frac{2}{3}$, and $10\frac{7}{8}$ read?

5. Is $\frac{1}{2}$ a proper fraction, an improper fraction, or a mixed number? $\frac{3}{2}$? $\frac{5}{2}$? $\frac{11}{2}$? $\frac{13}{2}$? $\frac{15}{2}$? $\frac{17}{2}$? $\frac{19}{2}$? Why?

6. A father bought 4 oranges, and cut each orange into 6 equal parts; how many pieces did the 4 oranges make?

7. He gave to Samuel 3 of the pieces; what fraction of an orange was that? He gave to James 5 pieces; what was his fraction of an orange? He gave to Mary 7 pieces; what was her fraction of an orange? He gave to Nancy 9 pieces; what fraction of an orange had she? Was Samuel's fraction proper or improper? Why? James'? Why? Mary's? Why? Nancy's? Why?

8. If a pie be cut into 8 equal pieces, and 2 of these pieces be given to Harry, what will be his fraction of the pie? If 5 pieces be given to John, what will be his fraction? What fraction or part of the pie will be left?

9. In 4 halves of an apple, how many whole apples?

SOLUTION. *Since 2 halves of an apple are equal to 1 whole apple, 4 halves are equal to as many apples as the number of times 2 halves are contained in 4 halves, which is 2 times. Therefore, 4 halves of an apple are equal to 2 apples.*

10. In 6 halves of an apple how many whole apples?

11. How many whole oranges are $\frac{3}{2}$ of an orange? — $\frac{5}{2}$ of an orange? — $\frac{7}{2}$ of an orange?

12. How many dollars in $\frac{1}{2}$ of a dollar? — in $\frac{3}{2}$? — in $\frac{5}{2}$? — in $\frac{7}{2}$? — in $\frac{9}{2}$?

13. How many yards in $\frac{3}{4}$ of a yard? — in $\frac{5}{4}$ of a yard? — in $\frac{7}{4}$? — in $\frac{9}{4}$? — in $\frac{11}{4}$?

14. How many miles in $\frac{1}{3}$ of a mile? — in $\frac{2}{3}$ of a mile? — in $\frac{4}{3}$? — in $\frac{5}{3}$? — in $\frac{7}{3}$? — in $\frac{8}{3}$?

15. How many bushels in $\frac{3}{4}$ of a bushel? — in $\frac{5}{4}$? — in $\frac{7}{4}$? — in $\frac{9}{4}$? — in $\frac{11}{4}$? — in $\frac{13}{4}$? — in $\frac{15}{4}$?

16. In what does the operation in the last seven examples consist?

Ans. *It consists in changing an improper fraction to a whole, or a mixed number.*

17. When we change the form of numbers without altering their value, what is the operation called?

Ans. *It is called Reduction.*

18. Then, what is reduction of fractions?

19. In $2\frac{1}{4}$ how many whole ones? How many fourths over?

20. Reduce $1\frac{3}{2}$ to a whole number.

21. How many whole ones in $\frac{5}{2}$? — in $\frac{4}{3}$? — in $\frac{4}{2}$?

LESSON IX.

1. How is an improper fraction reduced to a whole, or a mixed number?

Ans. *By dividing the numerator by the denominator.*

2. When can an improper fraction be reduced to a whole number?

3. When an improper fraction is reduced to a mixed number, what forms the whole number? — the fraction?

4. If I give 27 children $\frac{1}{4}$ of an orange each, how many oranges will it take?

SOLUTION. *It will take 27 times $\frac{1}{4}$ or $2\frac{1}{4}$; since $\frac{1}{4}$ make 1 orange, $2\frac{1}{4}$ are as many oranges as the number of times 4 fourths are contained in 27 fourths, which is 6 times and $\frac{3}{4}$ of a time. Therefore, it will take 6 and $\frac{3}{4}$ oranges to give 27 children $\frac{1}{4}$ of an orange each.*

5. In $4\frac{1}{2}$ of a dollar how many dollars?

6. In $3\frac{2}{3}$ of an hour how many hours?

7. In $1\frac{3}{4}$ of a yard how many yards?

8. In $5\frac{1}{2}$ of a gallon how many gallons?

9. Reduce $4\frac{1}{2}$ of a mile to miles.

10. Reduce $3\frac{1}{2}$ of an acre to acres.

11. Reduce $4\frac{1}{2}$ of a dollar to dollars.

12. How many days in $1\frac{1}{2}$ of a day? — in $7\frac{1}{2}$ of a day?

13. How many gallons in $3\frac{2}{3}$ of a gallon? — in $4\frac{2}{3}$ of a gallon?

14. How many bushels in $2\frac{1}{2}$ of a bushel? — in $2\frac{2}{3}$ of a bushel? — in $1\frac{1}{2}$ of a bushel?

15. A boy gave $\frac{2}{6}$ of a dollar for a coat; how many dollars did the coat cost him?

16. Bought 50 geese, at $\frac{1}{5}$ of a dollar apiece; how many dollars did they cost me?

17. A man bought $\frac{1}{8}$ of a barrel of flour; how many barrels did he buy?

18. It takes $\frac{2}{3}$ of a bushel of oats to keep 3 horses 1 week; how many bushels is that?

19. A man earned $\frac{1}{10}$ of a dollar in 1 hour; *how many dollars would he earn in 24 hours? — in 36 hours?*

20. *How many halves in 4 apples? — in 8 apples? — in 6 apples? — in 10 apples? — in 24 apples?*

21. *How many thirds of a dollar in 2 dollars? — in 12 dollars? — in 15 dollars? — in 20 dollars?*

22. In $2\frac{2}{3}$ yards how many thirds of a yard?

SOLUTION *In 2 yards there are 2 times as many thirds as there are in 1 yard; since there are 3 thirds in 1 yard, in 2 yards there are 2 times 3 thirds, which are 6 thirds, and 6 thirds + 2 thirds = 8 thirds. Therefore, in $2\frac{2}{3}$ yards there are $\frac{8}{3}$ of a yard.*

23. *How many thirds of a yard in $3\frac{1}{3}$ yards? — in $4\frac{2}{3}$ yards? — in $8\frac{1}{3}$ yards? — in 6 yards?*

24. Reduce $2\frac{1}{4}$ bushels to fourths. — $2\frac{3}{4}$ bushels. — $3\frac{1}{4}$ bushels. — 6 bushels. — 25 bushels. — $7\frac{3}{4}$ bushels.

LESSON X.

1. How is a whole number reduced to fifths?

ANS. *By multiplying 5, the number of fifths in a whole one, by the number, taking the product for the numerator of a fraction, and 5 for the denominator.*

2. *How is a whole number reduced to halves? — to thirds? — to sevenths? — to ninths? — to fifteenths?*

3. In 18 dollars how many halves of a dollar?

4. In 20 yards how many thirds of a yard?

5. In 9 gallons how many fourths of a gallon?

6. In 6 feet how many twelfths of a foot?

7. In 4 pounds of raisins how many eighths of a pound?

8. In 5 cents how many tenths of a cent?

9. *In 3 days how many twenty-fourths of a day?*

10. In $6\frac{3}{4}$ oranges how many fourths of an orange?
 11. How is a mixed number reduced to an improper fraction?

Ans. *By multiplying the denominator of the fraction by the whole number, and to the product adding the numerator of the fraction; this amount will form the numerator, and the denominator of the given fraction will be the denominator.*

12. In $5\frac{1}{2}$ dollars how many eighths of a dollar?
 13. In $6\frac{3}{4}$ hours how many sixths of an hour?
 14. In $4\frac{1}{2}$ yards how many thirds of a yard?
 15. In $14\frac{1}{2}$ gallons how many fourths of a gallon?
 16. Reduce $9\frac{3}{4}$ miles to fifths of a mile.
 17. Reduce $8\frac{2}{11}$ acres to elevenths of an acre.
 18. *How many eighths of a bushel in 3 bushels? — in $25\frac{1}{2}$ bushels? — in $18\frac{3}{4}$ bushels?*
 19. A man paid $5\frac{3}{4}$ dollars for a hat; how many fifths of a dollar did the hat cost him?
 20. It takes $2\frac{3}{4}$ yards of cloth to make a pair of pantaloons; how many fourths of a yard is that?
 21. A man paid $10\frac{7}{10}$ dollars for a cow; how many tenths of a dollar did the cow cost him?
 22. Paid $2\frac{1}{4}$ shillings for shoeing a horse; how many sixths of a shilling did I pay?
 23. A grocer retailed $4\frac{1}{2}$ barrels of sugar in 3 months; how many ninths of a barrel did he sell?
 24. In a barrel are $15\frac{3}{10}$ gallons of molasses; how many tenths of a gallon in the barrel?

LESSON XI.

1. In $\frac{1}{2}$ of an apple how many fourths?

SOLUTION. *In $\frac{1}{2}$ of an apple there are $\frac{1}{2}$ as many fourths as there are in 1 whole apple; in 1 apple there are 4 fourths, and in $\frac{1}{2}$ of an apple there are $\frac{1}{2}$ of 4 fourths, which = 2 fourths. Therefore, in $\frac{1}{2}$ of an apple there are $\frac{1}{2}$.*

2. In $\frac{1}{2}$ of an apple how many sixths? How many eighths? How many twelfths?

3. In $\frac{1}{3}$ of a pear how many sixths? *How many ninths? — twenty-fourths? — eighteenth?*

4. In $\frac{1}{4}$ of a dollar how many eighths? *How many twelfths? — twenty-eighths? — fortieths?*

5. In $\frac{1}{2}$ of an hour how many fifteenths?

6. In $\frac{1}{2}$ of a pound how many sixteenths? — eighty-eighths?

7. In $\frac{1}{10}$ of a year how many thirtieths? — fiftieths?

8. In $\frac{2}{3}$ of a yard how many sixths?

SOLUTION. *First find how many sixths in $\frac{1}{3}$ of a yard; in $\frac{1}{3}$ of a yard there are $\frac{1}{3}$ as many sixths as there are in 1 yard; in one yard there are 6 sixths, and in $\frac{1}{3}$ of a yard there are $\frac{1}{3}$ of 6 sixths, which = 2 sixths. Then, in $\frac{2}{3}$ of a yard there are 2 times as many sixths as there are in $\frac{1}{3}$ of a yard; since there are 2 in $\frac{1}{3}$ of a yard, in $\frac{2}{3}$ of a yard there are 2 times 2, which = 4 sixths. Therefore, in $\frac{2}{3}$ of a yard there are $\frac{4}{6}$.*

9. In $\frac{3}{4}$ of an orange how many eighths? *How many twelfths? — twentieths? — thirty-sixths?*

10. Reduce $\frac{3}{8}$ of a day to tenths.

11. Reduce $\frac{1}{4}$ of a mile to fourteenths.

12. Reduce $\frac{3}{8}$ of a shilling to sixtieths.

13. *How many twelfths in $\frac{1}{3}$? — in $\frac{2}{3}$? — in $\frac{5}{6}$?*

14. *How many sixteenths in $\frac{1}{4}$? — in $\frac{3}{8}$? — in $\frac{7}{8}$?*

15. *How many twenty-fourths in $\frac{1}{2}$? — in $\frac{3}{4}$? — in $\frac{5}{8}$? — in $\frac{7}{8}$? — in $\frac{9}{12}$?*

16. *How many fiftieths in $\frac{2}{10}$? — in $\frac{4}{5}$? — in $\frac{1}{5}$?*

17. If the numerator and denominator of $\frac{2}{5}$ be multiplied by 3, what will the fraction become?

ANS. $2 \times 3 = 6$, and $5 \times 3 = 15$; it will become $\frac{6}{15}$.

18. Is the fraction $\frac{2}{5}$ equal to $\frac{6}{15}$?

19. Then, if the numerator and denominator of a fraction be multiplied by the same number, is the value of the fraction altered?

ANS. *It is not, because one term of the fraction is increased just as many times as the other.*

20. How may $\frac{2}{5}$ be reduced to twentieths?

ANS. *By multiplying both terms of the fraction by 4.*

21. By what number will you multiply the terms of the fraction $\frac{2}{5}$, to reduce it to twenty-fifths? By what number to reduce it to fortieths?

22. Reduce $\frac{1}{2}$ to twenty-sevenths. To sixty-thirds. To eighty-firsts. To ninetyeths.

23. Reduce $\frac{2}{3}$ to thirty-thirds. To sixty-sixths.

24. By what number do you multiply the terms of any fraction to reduce it, as from fourths to twelfths, from thirds to eighteenth, from fifths to thirtieths, &c.?

ANS. *By any number that will reduce the denominator of the given fraction to the denominator of the required fraction.*

25. How may you reduce $\frac{3}{8}$ to fortieths? Why? How $\frac{3}{8}$ to thirty-sixths? How $\frac{5}{12}$ to eighty-fourths?

26. How may you reduce $\frac{1}{8}$ to eighteenth? Why? How $\frac{4}{10}$ to hundredths? How $\frac{5}{20}$ to sixtieths? How $\frac{7}{8}$ to hundredths?

LESSON XII.

1. In $\frac{1}{2}$ how many fourths? — eighths? — sixteenth?

2. Is there any difference between $\frac{1}{2}$ and $\frac{2}{4}$? Between $\frac{1}{2}$ and $\frac{4}{8}$? Between $\frac{4}{8}$ and $\frac{8}{16}$?

3. Then, which is the most, $\frac{1}{2}$, $\frac{2}{4}$, $\frac{4}{8}$, or $\frac{8}{16}$?

4. How can you show that $\frac{8}{16}$ is the same as $\frac{1}{2}$?

ANS. *If an apple be cut into 16 equal pieces, 1 piece will be $\frac{1}{16}$ of the apple, 8 pieces will be $\frac{8}{16}$, and $\frac{8}{16}$ will be just $\frac{1}{2}$ of the apple.*

5. How may $\frac{8}{16}$ be changed to $\frac{4}{8}$?

ANS. *By dividing both terms of the fraction by 2.*

6. How may $\frac{4}{8}$ be reduced to $\frac{2}{4}$? $\frac{2}{4}$ to $\frac{1}{2}$?

7. Can both terms of $\frac{1}{2}$ be divided by any number greater than 1?

8. Then, what is said of $\frac{1}{2}$?

ANS. *It is said to be in its lowest terms.*

9. When is any fraction in its lowest terms?

ANS. *When no number greater than 1 will exactly divide its numerator and denominator.*

10. How is any fraction reduced to its lowest terms?

ANS. *By dividing both terms by any number that will exactly divide them, and this quotient in the same manner, and so on, till no number greater than 1 will exactly divide both numerator and denominator.*

11. Reduce $\frac{8}{12}$, $\frac{3}{8}$, $\frac{2}{5}$, and $\frac{1}{6}$ to their lowest terms.

12. When can a number be divided by 5?

ANS. *When the unit figure is 5 or 0.*

13. Reduce $\frac{4}{20}$, $\frac{6}{14}$, $\frac{10}{24}$, $\frac{16}{30}$, $\frac{20}{36}$, and $\frac{14}{18}$ to their lowest terms.

14. When can a number be divided by 2?

ANS. *When the unit figure is 0, 2, 4, 6 or 8.*

15. Reduce $\frac{20}{30}$, $\frac{28}{36}$, $\frac{30}{60}$, and $\frac{48}{60}$ to their lowest terms.

16. When can a number be divided by 10?

ANS. *When the unit figure is 0.*

17. Reduce $\frac{16}{20}$, $\frac{24}{40}$, $\frac{28}{36}$, $\frac{30}{60}$, and $\frac{120}{144}$ to their lowest terms.

18. When can a number be divided by 4?

ANS. *When the units and tens can be divided by 4.*

19. James has $\frac{3}{4}$ of an apple, and Charles has $\frac{5}{8}$; which has the greater fraction?

Remark. Reduce the fractions to their lowest terms.

20. Ellen has $\frac{6}{30}$ of a dollar, and Emma has $\frac{8}{40}$; which has the greater fraction?

21. A man paid $\frac{1}{4}$ of a dollar for 7 pounds of sugar, and $\frac{70}{100}$ of a dollar for 2 gallons of molasses; which cost the most?

22. A grocer has $\frac{1}{2}$ of a barrel of sugar in one cask, $\frac{1}{3}$ of a barrel in another, and $\frac{50}{120}$ of a barrel in another; which cask contains the most sugar?

23. Andrew dug 3 rows of potatoes; from the first row he got $\frac{3}{8}$ of a bushel, from the second row $\frac{1}{2}$ of a bushel; and from the third row $\frac{4}{8}$ of a bushel; from which row did he get the most?

24. A clerk sold to one person $\frac{1}{2}$ of a pound of tea, to another person $\frac{6}{8}$ of a pound, to another $\frac{4}{8}$ of a pound, to another $\frac{8}{8}$ of a pound, to another $\frac{7}{8}$ of a pound, and to another $\frac{50}{100}$ of a pound; to which person did he sell the greatest quantity?

LESSON XIII.

1. A boy gave to one of his companions $\frac{3}{8}$ of an orange, to another $\frac{4}{8}$, and to another $\frac{1}{8}$; what part of an orange did he give away?

SOLUTION. *He gave away 2 eighths + 4 eighths + 1 eighth, which = 7 eighths. Therefore, he gave away $\frac{7}{8}$ of an orange.*

2. A boy, having $\frac{7}{10}$ of a dollar, expended $\frac{3}{10}$ of it; what part of a dollar had he left?

SOLUTION. *He had left the difference between $\frac{7}{10}$ and $\frac{3}{10}$; 7 tenths — 3 tenths = 4 tenths. Therefore, he had $\frac{4}{10}$ of a dollar left.*

3. A girl paid $\frac{1}{10}$ of a dollar for a yard of ribbon, $\frac{2}{10}$ of a dollar for some muslin, and $\frac{1}{10}$ of a dollar for a pound of tea; what part of a dollar did she spend?

4. A farmer planted $\frac{1}{10}$ of his farm to potatoes, $\frac{2}{10}$ of it to corn, sowed $\frac{2}{10}$ of it to wheat, $\frac{3}{10}$ of it to oats, and kept the remainder for pasture; what part of his farm was tilled? What part of it was pasture?

5. A man, having one dollar, spent $\frac{2}{5}$ of it; what part of a dollar had he left?

SOLUTION. *He had left the difference between 1 dollar and $\frac{2}{5}$ of a dollar; 1 dollar = $\frac{5}{5}$, and $\frac{5}{5} - \frac{2}{5} = \frac{3}{5}$. Therefore, he had $\frac{3}{5}$ of a dollar left.*

6. A man, owning 1 acre of land, sold $\frac{2}{5}$ of it; what part of an acre had he left?

7. A boy carried a bushel of chestnuts to market; he sold $\frac{1}{8}$ of them to one man, $\frac{2}{8}$ of them to another, $\frac{1}{8}$ to another, and $\frac{1}{8}$ to another; what part of the whole bushel did he sell? What part had he left?

8. $\frac{1}{5}$ of a certain farm is timbered land, $\frac{1}{5}$ wheat land, $\frac{1}{5}$ grass land, and the remainder is a marsh; what part of the farm is marsh?

9. Edward, having $\frac{1}{2}$ of a bushel of walnuts, gave Daniel $\frac{1}{4}$ of a bushel for a book; what part of a bushel had he left?

10. A man bought $\frac{1}{2}$ of a cord of wood; he used $\frac{1}{4}$ of it in one week, and $\frac{1}{4}$ the next; how much did he use in the two weeks? How much had he left?

11. A woman carried some butter, some eggs, and some dried fruit to market; she sold the butter for $\frac{1}{10}$ of a dollar, the eggs for $\frac{1}{10}$ of a dollar, and the dried fruit for $\frac{1}{10}$ of a dollar; how much did the whole come to?

SOLUTION. *The whole came to $\frac{1}{10}$, $\frac{1}{10}$, and $\frac{1}{10}$ of a dollar, which = $\frac{3}{10}$ of a dollar, or $1\frac{3}{10}$ dollars. Therefore, the whole came to $1\frac{3}{10}$ dollars.*

12. A man sold a lamb for $\frac{1}{2}$ of a dollar, a goose for $\frac{1}{4}$ of a dollar, a hen for $\frac{1}{4}$ of a dollar, and a duck for $\frac{1}{4}$ of a dollar; how much did he receive?

13. How much is $\frac{1}{30} + \frac{4}{30} + \frac{2}{30} + \frac{7}{30} + \frac{10}{30} + \frac{5}{30}$?

14. How much is $\frac{1}{9} + \frac{8}{9} + \frac{3}{9} + \frac{6}{9} + \frac{5}{9} + \frac{7}{9} + \frac{2}{9}$?

15. How much is $\frac{1}{5} + \frac{1}{6} + \frac{2}{6} - \frac{3}{6}$?

16. How much is $\frac{2}{11} + \frac{1}{11} + \frac{5}{11} + \frac{3}{11} - \frac{2}{11}$?

17. How much is $1 - \frac{1}{3}$? $\text{---} 1 - \frac{2}{3}$? $\text{---} 2 - \frac{1}{3}$?
 $\text{---} 2 - \frac{2}{3}$?

18. How much is $2\frac{3}{4} + 3\frac{1}{4} + 5\frac{2}{4} + \frac{3}{4}$?

SOLUTION. $2 + 3 + 5 = 10$; $\frac{3}{4} + \frac{1}{4} + \frac{2}{4} + \frac{3}{4} = \frac{9}{4}$, or $2\frac{1}{4}$; then, $10 + 2\frac{1}{4} = 12\frac{1}{4}$.

19. A man paid $2\frac{1}{2}$ dollars for a sheep, $1\frac{1}{2}$ dollars for a calf, $6\frac{3}{4}$ for a hog, and $12\frac{1}{2}$ dollars for a cow; how much did he pay for all?

20. A man sold a cord of wood for $3\frac{1}{2}$ dollars, a firkin of butter for $7\frac{3}{4}$ dollars, and a cheese for $2\frac{1}{4}$ dollars; how much did he receive for all?

21. A lady paid $3\frac{1}{2}$ dollars for a bonnet, $1\frac{1}{2}$ dollars for trimmings, and $\frac{1}{2}$ dollar for having it trimmed; how much did the bonnet cost her?

LESSON XIV.*

1. A merchant sold $2\frac{1}{4}$ yards of broadcloth, from a piece containing $5\frac{3}{4}$ yards; how many yards were left in the piece?

SOLUTION. *There was left the difference between $5\frac{3}{4}$ yards and $2\frac{1}{4}$ yards; 5 yards — 2 yards = 3 yards, and $\frac{3}{4}$ of a yard — $\frac{1}{4}$ of a yard = $\frac{2}{4}$ or $\frac{1}{2}$ of a yard, which, added to 3 yards, makes $3\frac{1}{2}$ yards. Therefore, $3\frac{1}{2}$ yards were left in the piece.*

2. A mason bought $12\frac{3}{4}$ bushels of lime, and used $6\frac{3}{4}$ bushels of it in laying a stove chimney; how many bushels had he left?

3. A barrel will hold $3\frac{1}{4}$ bushels of apples; if 2 bushels of apples be put into it, how many more will there be room for?

4. A man put $5\frac{1}{4}$ gallons of milk into 2 pails, putting $3\frac{3}{4}$ gallons into one of them; how many gallons did he put into the other?

* See Note 18.

5. A woman sold $15\frac{3}{8}$ pounds of butter, and received goods in payment for $10\frac{1}{8}$ pounds, and cash in payment for the remainder; how much butter did she sell for cash?

6. A woman dried $25\frac{1}{2}$ bushels of apples, and $12\frac{1}{2}$ bushels of peaches; how many more apples than peaches did she dry?

7. How much is $3\frac{1}{2} - \frac{1}{2}$? — $4\frac{1}{2} - 3$?

8. A man, having $1\frac{1}{2}$ dollars, paid $\frac{1}{4}$ of a dollar for a quarter of veal; how much money had he left?

SOLUTION. He had left the difference between $1\frac{1}{2}$ dollars and $\frac{1}{4}$ of a dollar; we cannot take $\frac{1}{4}$ of a dollar from $\frac{1}{2}$ of a dollar, hence we must reduce $1\frac{1}{2}$ dollars to an improper fraction; $1\frac{1}{2}$ dollars = $\frac{3}{2}$ of a dollar, and $\frac{1}{4}$ of a dollar = $\frac{1}{4}$ of a dollar = $\frac{1}{2}$ of a dollar. Therefore, he had $\frac{1}{4}$ of a dollar left.

9. Rebecca gathered $4\frac{1}{2}$ quarts of strawberries, and Esther gathered $6\frac{1}{2}$ quarts; how many quarts did Esther gather more than Rebecca?

SOLUTION. Esther gathered $6\frac{1}{2}$ quarts — $4\frac{1}{2}$ quarts more than Rebecca; $6\frac{1}{2}$ quarts = $2\frac{1}{2}$ of a quart, and $4\frac{1}{2}$ quarts = $1\frac{1}{2}$ of a quart; then, $2\frac{1}{2}$ of a quart — $1\frac{1}{2}$ of a quart = 1 of a quart, which = $1\frac{1}{2}$ or $1\frac{1}{2}$ quarts. Therefore, Esther gathered $1\frac{1}{2}$ quarts more than Rebecca.

10. A man bought $12\frac{7}{10}$ barrels flour, and sold $5\frac{2}{10}$ barrels of it; how many barrels had he left?

11. A merchant bought cloth for $2\frac{3}{8}$ dollars a yard, and sold it for $4\frac{1}{8}$ dollars a yard; how much did he make on one yard?

12. A grocer bought a cheese weighing $21\frac{3}{8}$ pounds, and sold 15 pounds of it; how much had he left?

13. A butcher sold to an innkeeper $18\frac{1}{2}$ pounds of beef, and $9\frac{1}{2}$ pounds of mutton; how much more beef than mutton did he sell?

14. A woman made $15\frac{3}{8}$ pounds of butter in 1 week, and sold $10\frac{3}{8}$ pounds of it to a merchant; how much remained unsold?

15. From a board $13\frac{1}{2}$ feet in length, I cut off two pieces, one of them $3\frac{1}{2}$ feet long, and the other $8\frac{1}{2}$ feet long; how many feet remained?

16. A dairyman carried $50\frac{1}{2}$ pounds of butter to market; he sold to one person $20\frac{1}{2}$ pounds, to another $10\frac{1}{2}$ pounds, and to a third the rest; how many pounds did the third person buy?

17. A merchant bought $3\frac{2}{12}$ dozens of eggs of one person, $5\frac{1}{12}$ dozens of another, and $10\frac{7}{12}$ dozens of another, and afterwards sold $13\frac{4}{12}$ dozens of them; how many dozens remained unsold?

18. How many are $3\frac{1}{2} + 5\frac{1}{2} + 8 + 12\frac{1}{2}$?

19. How many are $11\frac{3}{8} + 3\frac{2}{8} + 10\frac{4}{8} - 12\frac{3}{8}$?

20. How many are $9\frac{3}{10} + 29\frac{4}{10} - 19\frac{4}{10}$?

21. How many are $7\frac{3}{8} + 4\frac{3}{8} + 8\frac{3}{8} - 12\frac{3}{8}$?

LESSON XV.

1. If I give $\frac{1}{2}$ of an apple to one boy, and $\frac{1}{2}$ of an apple to another, how much will I give to both?

SOLUTION. I will give them $\frac{1}{2}$ of an apple $+$ $\frac{1}{2}$ of an apple; $\frac{1}{2}$ of an apple $= \frac{2}{4}$ of an apple, and $\frac{2}{4}$ of an apple $+$ $\frac{2}{4}$ of an apple $= \frac{4}{4}$ of an apple. Therefore, I will give them both $\frac{4}{4}$ of an apple.

2. A boy, having an orange, gave $\frac{2}{4}$ of it to his sister, and $\frac{1}{4}$ of it to his brother; what part of the orange did he give away?

Remark: Reduce the $\frac{2}{4}$ to eighths.

3. A man sowed $\frac{2}{6}$ of a bushel of clover seed on one field, and $\frac{2}{6}$ of a bushel on another; how many sixths of a bushel did he sow on both fields? How many bushels?

4. Rufus has $\frac{2}{8}$ of a dollar, and Charles has $\frac{1}{8}$ of a dollar; how many eighths of a dollar have they together? How many dollars?

5. One village lot contains $\frac{2}{10}$ of an acre of ground, and another $\frac{7}{10}$ of an acre; how many tenths of an acre in both lots? How many acres?

6. A man has 2 jugs, one of which will hold $\frac{2}{12}$ of a gallon, and the other $\frac{10}{12}$ of a gallon; how many twelfths of a gallon will it take to fill them both? How many gallons?

7. A man has $\frac{1}{12}$ of a barrel of sugar in one cask, $\frac{1}{12}$ in another, and $\frac{2}{12}$ in another; how many twelfths of a barrel in all? How many barrels?

8. In $\frac{1}{12}$, $\frac{2}{12}$, and $\frac{3}{12}$, how many twelfths? How many whole ones?

9. In $\frac{1}{10}$, $\frac{1}{10}$, and $\frac{7}{10}$, how many tenths? How many whole ones?

10. In $\frac{3}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, and $\frac{1}{2}$, how many sixteenths? How many whole ones?

11. Reduce $\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{8}$, and $\frac{1}{18}$, to eighteenths; how many eighteenths in all?

12. In $\frac{1}{4}$ of a pound, $\frac{1}{8}$ of a pound, $\frac{3}{4}$ of a pound, and $\frac{5}{8}$ of a pound how many sixteenths of a pound? How many eighths of a pound? How many pounds?

13. $\frac{1}{2} + \frac{3}{8} + \frac{1}{16} + \frac{1}{16} + \frac{1}{8} =$ how many twentieths? How many whole ones?

14. A man plowed $1\frac{1}{8}$ acres in one day, and $2\frac{1}{4}$ acres the next; how many acres did he plow in the two days?

SOLUTION. He plowed $1\frac{1}{8}$ acres + $2\frac{1}{4}$ acres; 1 acre + 2 acres = 3 acres; $\frac{1}{8}$ of an acre = $\frac{2}{8}$ of an acre, and $\frac{3}{8}$ of an acre + $\frac{1}{8}$ of an acre = $\frac{4}{8}$ or $1\frac{1}{2}$ acres, which added to 3 acres, = $4\frac{1}{2}$ acres. Therefore, he plowed $4\frac{1}{2}$ acres.

15. A man cradled $4\frac{1}{10}$ acres of wheat in one day, and $3\frac{1}{2}$ acres the next; how many acres did he cradle in the two days?

16. An arithmetic costs $\frac{2}{10}$ of a dollar, a slate $\frac{1}{4}$ of a dollar, and a grammar $\frac{3}{8}$ of a dollar; how many twentieths of a dollar will it take to buy an arithmetic, a slate, and a grammar? How many dollars?

17. One man owes me $10\frac{3}{4}$ dollars, another $4\frac{7}{8}$ dollars, and another $5\frac{1}{2}$ dollars; how many dollars are due to me?

Remark. Reduce the fractions to twenty-fourths.

18. A man bought a pair of boots for himself for $3\frac{1}{4}$ dollars, a pair of slips for his wife for $1\frac{1}{8}$ dollars, a pair of boots for his son for $2\frac{1}{2}$ dollars, and a pair of shoes for his little daughter for $1\frac{1}{16}$ dollars; how many dollars did he pay for all?

Remark. Reduce the fractions to sixteenths.

19. How many twenty-fifths of a bushel in $1\frac{1}{2}$ bushels, $2\frac{3}{5}$ bushels, $\frac{1}{2}$ of a bushel, and $3\frac{1}{5}$ bushels? How many bushels?

20. $7\frac{3}{8}$ yards + $10\frac{3}{8}$ yards + $1\frac{3}{16}$ yards + $\frac{1}{4}$ of a yard = how many yards?

21. $\frac{1}{10}$ of a pound + $4\frac{3}{8}$ pounds + $9\frac{3}{10}$ pounds + $2\frac{1}{2}$ pounds + $3\frac{1}{2}$ pounds + $\frac{1}{40}$ of a pound = how many pounds?

Remark. Reduce the fractions to fortieths.

22. $1\frac{1}{2} + 3\frac{1}{2} + 7\frac{1}{2} + 4\frac{1}{2} + 7\frac{1}{2} =$ how many?
 23. $6 + 9 + 12\frac{1}{2} + 18\frac{1}{2} + 31\frac{1}{2} =$ how many?
 24. From $\frac{2}{5} + \frac{7}{10} + 4\frac{1}{2} + 3\frac{2}{5}$ take $2\frac{1}{2} + 1\frac{1}{2} + \frac{1}{10}$.

Remark. Reduce the fractions to twentieths.

LESSON XVI.

1. When have fractions a common denominator?

ANS. *When the denominators of two or more fractions are alike, they have a common denominator.*

2. Have the fractions $\frac{2}{5}$, $\frac{1}{5}$, and $\frac{1}{5}$ a common denominator? — $\frac{1}{5}$, $\frac{2}{5}$, and $\frac{3}{5}$? — $\frac{1}{10}$, $\frac{1}{10}$, and $\frac{2}{10}$?

3. When fractions have a common denominator, how are they added?

ANS. *By adding together their numerators, and placing the amount over the common denominator.*

4. If the amount be an improper fraction, what must be done?

5. What is the amount of $\frac{2}{5}$, $\frac{1}{5}$, $\frac{2}{5}$, and $\frac{2}{5}$? — of $\frac{2}{7}$, $\frac{1}{7}$, $\frac{2}{7}$, $\frac{2}{7}$, and $\frac{2}{7}$?

6. How are mixed numbers added?

ANS. *By first adding the whole numbers, then the fractions, and then adding the two amounts together.*

7. What is the amount of $2\frac{1}{5}$, $5\frac{2}{5}$, 7, 1, and $4\frac{3}{5}$? — of $2\frac{1}{10}$, $4\frac{5}{10}$, 12, $1\frac{3}{10}$, $\frac{1}{10}$, and $\frac{2}{10}$?

8. When fractions have a common denominator, how are they subtracted?

ANS. *By subtracting the numerator of the subtrahend from the numerator of the minuend, and placing the remainder over the common denominator.*

9. How much is $\frac{2}{3} - \frac{1}{3}$? — $\frac{5}{8} - \frac{3}{8}$? — $1\frac{1}{2} - \frac{1}{2}$? — $\frac{2}{5} + \frac{2}{5} - \frac{2}{5}$? — $\frac{2}{11} + \frac{1}{11} + \frac{1}{11} - \frac{1}{11}$?

10. How are mixed numbers subtracted?

ANS. *By first reducing them to improper fractions, and then subtracting their numerators. Or, when the fraction in the subtrahend is less than that in the minuend, we may first subtract the whole numbers, then the fractions, and then add the two remainders together.*

11. From $5\frac{3}{4}$ take $2\frac{1}{4}$. From $7\frac{2}{3}$ take $4\frac{1}{3}$. From $12\frac{2}{10}$ take $3\frac{7}{10}$. From $25\frac{1}{10}$ take $17\frac{5}{10}$.

12. How much is $4\frac{1}{2} - 2\frac{1}{2}$? — $9\frac{2}{3} - 4\frac{1}{3}$? — $7 - 3\frac{1}{2}$? — $4\frac{1}{2} - 2$? — $6\frac{2}{3} - 5\frac{1}{3}$?

13. How can you subtract halves from fourths, or fourths from halves?

Ans. By first reducing the halves to fourths.

14. How can you subtract halves or fourths from eighths, or eighths from fourths or halves?

15. How can fifths be subtracted from tenths? — from fifteenths? — from twentieths? — from twenty-fifths?

16. How can halves and fourths be added? — halves and eighths? — halves, fourths, and eighths?

17. How can thirds and sixths be added? — sixths and twelfths? — thirds, sixths, and twelfths?

18. How can halves, fourths, eighths, and twelfths be added?

Ans. By reducing them to twenty-fourths.

19. Why not reduce them to twelfths, sixteenths, or twentieths?

Ans. Because eighths cannot be reduced to twelfths, twelfths to sixteenths, nor eighths nor twelfths to twentieths.

20. How many are $4\frac{1}{2} + 3\frac{1}{2} + 5\frac{1}{2}$?

21. How many are $5\frac{1}{2} + 7\frac{1}{2} + \frac{6}{8} + \frac{3}{4}$?

22. How many are $6\frac{2}{3} + 7\frac{2}{3} + 12 - 5\frac{2}{3}$?

23. How many are $12\frac{1}{2} - 7\frac{1}{2}$? — $9\frac{1}{4} - 4\frac{1}{4}$?

24. How many are $1\frac{1}{2} + 2\frac{2}{3} + 3\frac{1}{4} + 4\frac{5}{8} + 5\frac{7}{8}$?

25. How many are $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} + \frac{1}{12} + \frac{1}{24}$?

26. From $12\frac{2}{3} + 3\frac{4}{6} + 1\frac{8}{6}$ take $\frac{2}{3} + \frac{1}{4} + \frac{1}{6}$.

27. From $5\frac{1}{2} + 8\frac{4}{8}$ take $1\frac{1}{2} + 7\frac{2}{5} + \frac{3}{10}$.

LESSON XVII.

1. Can $\frac{1}{2}$ and $\frac{2}{3}$ be reduced to tenths?

Ans. They cannot, because ten will not exactly contain 3, the denominator of $\frac{1}{3}$.

2. To what denominator can they be reduced?

Ans. They can be rendered to fifteenths, because fifteen will exactly contain 3, the denominator of $\frac{1}{3}$, and 5, the denominator of $\frac{2}{5}$.

3. When fractions have not a common denominator, to what common denominator may they be reduced?

Ans. To any denominator that will exactly contain the denominator of each fraction.

4. Reduce $\frac{1}{2}$, $\frac{2}{3}$, and $\frac{3}{4}$ to a common denominator.

SOLUTION. They may be reduced to thirty-sixths; in 1 whole one there are $\frac{36}{36}$, and in $\frac{1}{2}$ there are $\frac{1}{2}$ of $\frac{36}{36}$, which = $\frac{18}{36}$; in $\frac{2}{3}$ there are $\frac{2}{3}$ of $\frac{36}{36}$, which = $\frac{24}{36}$, and in $\frac{3}{4}$ there are 5 times $\frac{3}{4}$, which = $\frac{27}{36}$; in $\frac{1}{2}$ there are $\frac{1}{2}$ of $\frac{36}{36}$, which = $\frac{18}{36}$, and in $\frac{3}{4}$ there are 4 times $\frac{3}{4}$, which = $\frac{27}{36}$. Therefore, $\frac{1}{2} = \frac{18}{36}$, $\frac{2}{3} = \frac{24}{36}$, and $\frac{3}{4} = \frac{27}{36}$.

5. Reduce $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ to a common denominator.

6. Reduce $\frac{1}{2}$, $\frac{1}{10}$, and $\frac{1}{15}$ to a common denominator.

7. Reduce $\frac{1}{2}$, $\frac{2}{3}$, and $\frac{1}{12}$ to a common denominator.

8. Is it always obvious what number will be a common denominator of several fractions?

9. How may such a number be found?

Ans. By multiplying all the denominators together, the product will always be a number which will exactly contain all the denominators.

10. Reduce $\frac{1}{2}$ and $\frac{1}{3}$ to a common denominator.

11. Reduce $\frac{2}{3}$ and $\frac{1}{4}$ to a common denominator.

12. Reduce $\frac{3}{4}$ and $\frac{1}{10}$ to a common denominator.

13. Reduce $\frac{1}{2}$, $\frac{2}{3}$, and $\frac{1}{4}$ to a common denominator, and add them together.

14. Add together $\frac{2}{3}$ and $\frac{1}{4}$.

15. What is the difference between $\frac{1}{2}$ and $\frac{1}{3}$? — $\frac{2}{3}$ and $\frac{1}{4}$? — $\frac{2}{3}$ and $\frac{1}{5}$? — $\frac{1}{2}$ and $\frac{2}{3}$?

16. How much is $1 - \frac{1}{2}$? — $2 - \frac{2}{3}$? — $2\frac{2}{3} - \frac{1}{4}$?

17. How much is $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} - 1\frac{1}{2}$? — $3\frac{1}{2} - \frac{1}{10}$?

18. A mother gave $\frac{1}{4}$ of a pie to Edwin, $\frac{2}{3}$ of it to Hannah, and the rest to Martha; how much of the pie did Martha receive?

19. A grocer sold $2\frac{1}{2}$ pounds of tea to one man, $1\frac{1}{2}$ pounds to another, and $\frac{3}{4}$ of a pound to another; how much tea did he sell in all?

20. A miller sold $6\frac{1}{2}$ barrels of flour to one man, and $4\frac{3}{4}$ barrels to another; how many barrels did he sell to both? How much more to one than to the other?

21. A man paid $3\frac{1}{2}$ dollars for a sheep, $12\frac{1}{2}$ dollars for a cow, and $1\frac{1}{4}$ dollars for a calf; how much did they all cost him?

22. A man, having a journey to perform, traveled $\frac{1}{2}$ of it in one day, $\frac{1}{10}$ of it the next day, $\frac{1}{5}$ of it the next day,

and the remainder the fourth day; what part of the journey did he perform the first three days? What part the fourth day?

23. A man has his sheep in three pastures; in the first pasture are $\frac{2}{3}$ of his sheep, and in the second $\frac{1}{3}$ of them; what part of his sheep in the third pasture?

LESSON XVIII.

1. A man bought 2 yards of cloth, at $\frac{1}{2}$ of a dollar a yard; how much did it cost him?

SOLUTION. 2 yards cost 2 times as much as 1 yard; since 1 yard cost $\frac{1}{2}$ of a dollar, 2 yards cost 2 times $\frac{1}{2}$ of a dollar, which $= \frac{2}{2}$ of a dollar. Therefore, it cost him $\frac{2}{2}$ of a dollar.

2. If a cow consume $\frac{1}{3}$ of a bushel of meal in 1 day, how much will she consume in 3 days?

3. How much will 7 days' board come to, at $\frac{2}{3}$ of a dollar a day?

Remark. When the product is an improper fraction, reduce it to a whole, or a mixed number.

4. A boy bought 5 cakes, at $\frac{2}{3}$ of a shilling each; how many shillings did they cost him?

5. At $\frac{2}{3}$ of a dollar a pound, how much will 7 pounds of wool come to?

6. A man bought 2 gallons of molasses, at $\frac{2}{3}$ of a dollar a gallon; how much did it cost him?

7. How much will 15 pounds of butter come to, at $\frac{1}{3}$ of a dollar a pound? How much at $\frac{2}{3}$ of a dollar a pound?

8. If a man spend $\frac{2}{3}$ of a dollar a day, how much will he spend in 7 days? — in 8 days? — in 12 days?

9. How many apples will it take to give 9 boys $\frac{1}{3}$ of an apple each? To give them $\frac{2}{3}$ of an apple each? — $\frac{1}{2}$ of an apple each?

10. A woman gave to her son $\frac{2}{3}$ of an apple; and to her daughter 5 times as much; how much did she give her daughter? How many apples did they both receive?

11. A man gave $\frac{2}{3}$ of a dollar for a bushel of corn, and 14 times as much for a barrel of flour; how much did the flour cost him?

12. A cloth cap costs $\frac{3}{8}$ of a dollar, and a fur hat costs 7 times as much; how much does a fur hat cost?

13. A father gave his 5 sons $\frac{1}{2}$ of a dollar apiece; how many dollars did he give them all?

14. If a pound of butter cost $\frac{2}{5}$ of a dollar, how much will 10 pounds cost? How much will 15 pounds cost?

15. How much will 20 pounds of lard come to, at $\frac{1}{12}$ of a dollar a pound?

16. A woman sold a turkey weighing 13 pounds, at $\frac{1}{18}$ of a dollar a pound; how much did she get for it?

17. If $\frac{1}{3}$ of a yard of satin will make 1 vest, *how many yards will it take to make 5 vests?* — 8 vests?

18. If a horse consume $\frac{2}{3}$ of a ton of hay in 1 month, how much will it take to last him 6 months?

19. If $\frac{2}{3}$ of an acre will pasture 1 sheep, *how many acres will pasture 15 sheep?* — 30 sheep? — 40 sheep?

20. If a man can earn $\frac{3}{10}$ of a dollar a day, how much can he earn in a week?

21. How much will 5 bushels of wheat cost, at $\frac{7}{10}$ of a dollar a bushel?

22. *How much* will 50 quarts of milk cost, at $\frac{3}{100}$ of a dollar a quart? — at $\frac{1}{25}$ of a dollar a quart?

23. If 1 person consume $\frac{1}{3}$ of a barrel of flour in 2 months, how much will 7 persons consume in the same time? 12 persons? 20 persons?

24. If $\frac{1}{3}$ of a bushel of oats will keep a horse 1 day, how many bushels will keep him 10 days?

25. How many bushels will 7 horses eat in one day, at the above rate? 15 horses? 20 horses?

26. If a breakfast for 1 man cost $\frac{3}{10}$ of a dollar, how much will a breakfast for 10 men cost?

LESSON XIX.

1. If a man travel $3\frac{1}{2}$ miles in 1 hour, how far will he travel in 5 hours?

SOLUTION. *In 5 hours he will travel 5 times as far as he will in 1 hour; if he travel $3\frac{1}{2}$ miles in 1 hour, in 5 hours he will travel 5 times $3\frac{1}{2}$ miles; 5 times 3 miles = 15 miles, and 5 times $\frac{1}{2}$ of a mile = $\frac{5}{2}$ of a mile,*

or $1\frac{1}{4}$ miles, which, added to 15 miles = $16\frac{1}{4}$ miles. Therefore, he will travel $16\frac{1}{4}$ miles in 5 hours.

2. At $1\frac{3}{4}$ dollars a week, how much will 7 weeks' board come to?

3. How much will 12 sheep come to, at $2\frac{1}{2}$ dollars apiece? — at $1\frac{3}{4}$ dollars apiece?

4. If $1\frac{1}{2}$ bushels of wheat will seed 1 acre of ground, how many bushels will seed 20 acres? — 5 acres?

5. A man can plow $1\frac{1}{10}$ acres of land in one day; how many acres can he plow in 8 days?

6. How much will 9 barrels of flour cost, at $4\frac{1}{2}$ dollars a barrel?

7. How much will be the fare for 50 passengers from New York to Boston, at 4 dollars each?

8. If $3\frac{1}{4}$ yards will make 1 cloak, how many yards will it take to make 6 cloaks?

9. A man sold 7 cows, at $12\frac{3}{8}$ dollars apiece; how much did he receive for them?

10. How much will 8 firkins of butter come to, at $9\frac{1}{2}$ dollars a firkin?

11. Ten men did a certain piece of work in $5\frac{1}{10}$ days; how many days would it have taken 1 man to do the same work?

12. How much will 12 bunches of quills cost, at 6 $\frac{1}{2}$ cents a bunch? — at 9 $\frac{3}{8}$ cents a bunch? — at 12 $\frac{1}{2}$ cents a bunch?

13. How much is 9 times $8\frac{3}{10}$? — 5 times $12\frac{7}{10}$?

14. How much is 9 times $\frac{3}{10}$? — 4 times $\frac{1}{10}$?

15. A man bought 3 yards of broadcloth, at $4\frac{1}{4}$ dollars a yard, and 5 yards of satinnet, at $1\frac{1}{4}$ dollars a yard; how much did the whole cost him?

Remark. First find the cost of the broadcloth, next of the satinnet, and then add the two costs together.

16. A man bought 5 pounds of tea, at $\frac{3}{4}$ of a dollar a pound, and 15 pounds of loaf sugar, at $\frac{1}{2}$ of a dollar a pound; how much did he pay for all?

17. What is the difference between the cost of 10 yards of carpeting, at $\frac{3}{8}$ of a dollar a yard, and 7 yards of oil-cloth, at $1\frac{1}{2}$ dollars a yard?

18. A lady, having $10\frac{1}{2}$ dollars, bought 12 yards of silk, at $\frac{1}{2}$ of a dollar a yard; how much money had she left?

19. A bootmaker sold 6 pairs of calf boots, at $4\frac{1}{2}$ dollars a pair, and 8 pairs of morocco boots, at $6\frac{1}{2}$ dollars a pair; how much did they all come to? How much did the cost of the morocco boots exceed the cost of the calf boots?

LESSON XX.*

1. If a piece of cloth is worth 36 dollars, how much is $\frac{3}{4}$ of it worth?

SOLUTION. First find how much $\frac{1}{4}$ of it is worth; if $\frac{1}{4}$ are worth 36 dollars, $\frac{1}{4}$ is worth $\frac{1}{4}$ of 36 dollars, which = 9 dollars; then, $\frac{3}{4}$ are worth 3 times as much as $\frac{1}{4}$; if $\frac{1}{4}$ is worth 9 dollars, $\frac{3}{4}$ are worth 3 times 9 dollars, which = 27 dollars. Therefore, $\frac{3}{4}$ of it is worth 27 dollars.

2. A lady, having 50 dollars, paid $\frac{3}{5}$ of her money for a silk dress; how much did the dress cost her?

3. Bought $\frac{3}{4}$ of a barrel of sugar, at 14 dollars a barrel; how much did it cost me?

4. How much will $\frac{3}{4}$ of a barrel of flour come to, at 8 dollars a barrel?

5. A man, having 28 dollars, gave $\frac{1}{4}$ of his money for a cow; how much did the cow cost him?

6. A man gave $\frac{2}{11}$ of 88 bushels of wheat for a wagon; how many bushels of wheat did the wagon cost him?

7. A farmer, having 90 bushels of oats, sold $\frac{2}{3}$ of them; how many bushels did he sell?

8. How much is $\frac{3}{8}$ of 21? — $\frac{1}{7}$ of 56? — $\frac{2}{11}$ of 110? — $\frac{1}{5}$ of 63? — $\frac{1}{4}$ of 75? — $\frac{3}{10}$ of 100?

9. How much is $\frac{3}{4}$ of 40 + $\frac{1}{2}$ of 24? — $\frac{1}{7}$ of 49 + $\frac{2}{3}$ of 72? — $\frac{1}{2}$ of 60 — $\frac{3}{4}$ of 48? — $8\frac{1}{2}$ — $\frac{3}{4}$ of 8?

10. A man sold $\frac{1}{4}$ of 32 acres of land; how many acres did he sell?

SOLUTION. First find $\frac{1}{4}$ of 32 acres; $\frac{1}{4}$ of 32 acres is $6\frac{1}{2}$ acres, and $\frac{3}{4}$ of 32 acres are 4 times $6\frac{1}{2}$ acres; 4 times $6\frac{1}{2}$ acres = 24 acres, 4 times $\frac{3}{4}$ of an acre = $\frac{3}{4}$ of an acre, or $1\frac{1}{2}$ acres, and 24 acres + $1\frac{1}{2}$ acres = $25\frac{1}{2}$ acres. Therefore, he sold $25\frac{1}{2}$ acres.

11. A man bought 5 bushels of clover seed for 38 dol-

* See Note 16.

lars; how much did it come to? He sold 3 bushels of it at the cost price; how much did he receive for it?

12. If 4 yards of cloth cost 19 dollars, how much will 1 yard cost? How much will 3 yards cost?

13. Paid 9 dollars for 8 bushels of wheat; how much was that a bushel? How much for 5 bushels?

14. If 6 lemons cost 19 cents, how much will 5 lemons cost?

15. If 7 pounds of sugar cost 65 cents, how much will 4 pounds cost?

16. Bought 9 yards of calico for 28 shillings; how much would 7 yards cost at the same rate? How much would 12 yards cost?

17. If 3 quarts of chestnuts cost 20 cents, how much will 8 quarts cost?

18. A man bought a cow for 16 dollars, and sold her for $\frac{2}{3}$ of what she cost him; how much did he get for her? How much did he make by the bargain?

19. If 10 yards of cloth cost 6 dollars, how much will 4 yards cost? 7 yards? 12 yards?

20. *How much is* $\frac{3}{4}$ of 17 dollars? — $\frac{5}{8}$ of 25 cents?

21. *How much is* $\frac{3}{4}$ of 42? — $\frac{2}{3}$ of 15? — $\frac{1}{4}$ of 21? — $\frac{1}{5}$ of 31? — $\frac{1}{6}$ of 5? — $\frac{1}{2}$ of 3? — $\frac{1}{3}$ of 40? — $\frac{1}{10}$ of 25?

22. *How much is* $\frac{3}{4}$ of 27 + $\frac{1}{8}$ of 51? — $\frac{1}{4}$ of 13 — $\frac{1}{2}$ of 9?

LESSON XXI.

1. Albert, having 36 cents, spent $\frac{1}{3}$ of his money for candy, at 3 cents an ounce; how many ounces of candy did he buy?

SOLUTION. *First find how much money he spent; $\frac{1}{3}$ of 36 cents is 12 cents, and $\frac{1}{3}$ of 36 cents are 7 times 4 cents, which = 28 cents; then, since 1 ounce of candy cost 3 cents, 28 cents would buy as many ounces as the number of times 3 cents are contained in 28 cents, which are 9 $\frac{1}{3}$ times. Therefore, for $\frac{1}{3}$ of 36 cents he bought 9 $\frac{1}{3}$ ounces of candy, at 3 cents an ounce.*

2. A man sold a horse for 84 dollars, and took $\frac{1}{4}$ of his pay in flour, at 5 dollars a barrel; how many barrels of flour did he receive?

3. A girl, having 54 cents, paid out $\frac{1}{2}$ of her money for muslin, at 10 cents a yard; how many yards of muslin did she purchase?

4. A man, having 72 miles to travel, went $\frac{1}{3}$ of the distance in 6 hours; how many miles was that an hour?

5. A tailor received $\frac{1}{5}$ of 50 dollars for making 12 coats; how much was that apiece?

6. If $\frac{1}{3}$ of 63 yards of broadcloth will make 12 coats, how many yards will make 1 coat?

7. A stationer sold $\frac{1}{3}$ of 18 boxes of wafers for 36 cents; how much were they a box?

8. $\frac{1}{3}$ of 36 are how many times 3?

9. $\frac{1}{5}$ of 50 are how many times 4?

10. $\frac{1}{4}$ of 8 are how many times 5?

11. $\frac{1}{3}$ of 12 are how many times 7?

12. $\frac{1}{5}$ of 30 are how many times 4?

13. $\frac{1}{11}$ of 66 are how many times 12?

14. $\frac{1}{5}$ of 35 are how many times 6?

15. $\frac{1}{5}$ of 35 are how many times 2?

16. A grocer sold $10\frac{3}{4}$ pounds of sugar, at 8 cents a pound, and took his pay in butter, at 12 cents a pound; how many pounds of butter did he receive?

SOLUTION. First find the cost of the sugar; 10 pounds cost 10 times as much as 1 pound; since 1 pound cost 8 cents, 10 pounds cost 10 times 8 cents, which = 80 cents; $\frac{3}{4}$ of a pound cost $\frac{3}{4}$ as much as a pound; $\frac{1}{4}$ of 8 cents is 1 cent, and $\frac{3}{4}$ of 8 cents are 3 times 1 cent, which = 3 cents, and this added to 80 cents = 83 cents, the cost of the sugar; then, since 12 cents is the price of 1 pound of butter, 83 cents is the price of as many pounds as the number of times 12 cents are contained in 83 cents, which = $6\frac{1}{2}$ times. Therefore, $10\frac{3}{4}$ pounds of sugar, at 8 cents a pound, will come to $6\frac{1}{2}$ pounds of butter, at 12 cents a pound.

17. How many ounces of cinnamon, at 3 cents an ounce, must be given for $12\frac{1}{4}$ pounds paper rags, at 4 cents a pound?

18. How many ounces of indigo, at 10 cents an ounce, must be given for $9\frac{1}{2}$ dozens of eggs, at 8 cents a dozen?

19. A man sold 6 cows, at $12\frac{1}{2}$ dollars apiece, and took his pay in hay, at 10 dollars a ton; how many tons of hay did he receive?

20. I exchanged 15 bushels of barley worth $5\frac{1}{2}$ shillings a bushel, for oats worth 3 shillings a bushel; how many bushels of oats did I receive?

21. A man sold 24 cords of wood, for $2\frac{3}{4}$ dollars a cord, and took his pay in nails at 6 dollars a cask; how many casks of nails did he buy?

22. 9 times 3 dollars are how many times 5 dollars?

LESSON XXII.

1. 5 times $7\frac{2}{3}$ are how many times 6?

SOLUTION. 5 times 7 are 35, 5 times $\frac{2}{3}$ are $1\frac{1}{3}$ or 3, which added to 35 makes 38; then, $38 \div 6 = 6\frac{2}{3}$ or $6\frac{1}{2}$. Therefore, 5 times $7\frac{2}{3}$ are $6\frac{1}{2}$ times 6.

2. 4 times $9\frac{1}{2}$ are how many times 7?

3. 9 times $11\frac{3}{4}$ are how many times 12?

4. 8 times $4\frac{1}{2}$ are how many times 5?

5. 10 times $6\frac{3}{10}$ are how many times 2?

6. 3 times $8\frac{1}{3}$ are how many times 9?

7. 11 times $12\frac{4}{11}$ are how many times 10?

8. 6 times $5\frac{1}{2}$ are how many times 3?

9. 7 times $10\frac{1}{7}$ are how many times 8?

10. Explain the difference between $\frac{4}{5}$, and $\frac{4}{5}$ of 5.

Ans. $\frac{4}{5}$ expresses that 1 is divided into 5 equal parts, and that 4 of these parts are taken; $\frac{4}{5}$ of 5 expresses that 5 is divided into 5 equal parts, and 4 of these parts are taken; that is, $\frac{4}{5}$ means $\frac{4}{5}$ of 1 unit, and $\frac{4}{5}$ of 5 means $\frac{4}{5}$ of 5 units.

11. Explain the difference between $4\frac{3}{4}$, and 4 and $\frac{3}{4}$ of 4?

Ans. $4\frac{3}{4}$ means 4 units and $\frac{3}{4}$ of another unit; 4 and $\frac{3}{4}$ of 4 means 4 units + $\frac{3}{4}$ of 4 units.

12. What is the difference between $\frac{1}{2}$ and $\frac{1}{2}$ of 8? — $\frac{1}{2}$ and $\frac{1}{2}$ of 12?

13. What is the difference between $5\frac{3}{4}$, and 5 and $\frac{3}{4}$ of 5? — $8\frac{1}{2}$, and 8 and $\frac{1}{2}$ of 8?

14. 5 times 5 and $\frac{2}{5}$ of 5 are how many times 9?

SOLUTION. 5 times 5 are 25, $\frac{2}{5}$ of 5 is 2, and $\frac{2}{5}$ of 5 are 2 times 1 which are 2, and $25 + 2 = 27$; then, $27 \div 9 = 3$ times 9 and $\frac{1}{3}$ of 9. Therefore, 5 times 5 and $\frac{2}{5}$ of 5 are 3 times 9 and $\frac{1}{3}$ of 9.

15. 12 times 7 and $\frac{1}{4}$ of 7 are how many times 10?

16. 8 times 9 and $\frac{1}{3}$ of 9 are how many times 6?
17. 3 times 10 and $\frac{7}{10}$ of 10 are how many times 8?
18. 7 times 11 and $\frac{1}{11}$ of 11 are how many times 7?
19. 2 times 25 and $\frac{1}{25}$ of 25 are how many times 5?
20. 6 times 15 and $\frac{1}{15}$ of 15 are how many times 12?
21. 9 times 8 and $\frac{1}{8}$ of 8 are how many times 9?

LESSON XXIII.

1. A man, having $\frac{3}{4}$ of a dollar, paid it out for 2 palm-leaf hats; how much did the hats cost him apiece?

SOLUTION. 1 hat cost $\frac{1}{2}$ as much as 2 hats; since 2 hats cost $\frac{3}{4}$ of a dollar, 1 hat cost $\frac{1}{2}$ of $\frac{3}{4}$ of a dollar, which is $\frac{3}{8}$ of a dollar. Therefore, the hats cost him $\frac{3}{8}$ of a dollar apiece.

2. If 3 meals cost $\frac{1}{4}$ of a dollar, how much will 1 meal cost?

3. A blacksmith received $\frac{3}{4}$ of a dollar for setting 3 horseshoes; how much was that apiece?

4. If a bushel of apples is worth $\frac{1}{10}$ of a dollar, how much is $\frac{1}{2}$ of a bushel worth?

5. If $\frac{1}{10}$ of an acre of pasture will keep 3 sheep, what part of an acre will keep 1 sheep?

6. A chopper cut $\frac{3}{4}$ of a cord of wood in 2 hours; how much was that an hour?

7. A man, having $\frac{3}{4}$ of a dollar, gave $\frac{3}{4}$ of his money for a bushel of potatoes; what part of a dollar did the potatoes cost him?

SOLUTION. $\frac{3}{4}$ of $\frac{3}{4}$ of a dollar are 2 times as much as $\frac{1}{4}$ of $\frac{3}{4}$ of a dollar; $\frac{1}{4}$ of $\frac{3}{4}$ of a dollar is $\frac{1}{4}$ of a dollar, and $\frac{1}{4}$ of $\frac{3}{4}$ of a dollar are 2 times $\frac{1}{8}$ of a dollar, which are $\frac{2}{8}$ of a dollar. Therefore, the potatoes cost him $\frac{2}{8}$ of a dollar.

8. If $\frac{1}{4}$ of a dollar will pay for weaving 9 yards of flannel cloth, how much will pay for weaving 5 yards?

9. If 7 bushels of ashes are worth $\frac{1}{4}$ of a dollar, how much are 10 bushels worth?

10. At $\frac{1}{10}$ of a dollar for 3 bushels of meal, how much will 12 bushels cost?

11. A girl, having $\frac{3}{4}$ of a dollar, spent $\frac{1}{4}$ of it for linen; how much did the linen cost her?

12. If 6 persons eat $\frac{1}{4}$ of a pound of butter at a meal, how much will 20 persons eat?

13. How much is $\frac{1}{3}$ of $\frac{3}{4}$? — $\frac{1}{4}$ of $\frac{4}{5}$? — $\frac{1}{2}$ of $\frac{2}{3}$? — $\frac{2}{3}$ of $\frac{3}{4}$? — $\frac{3}{4}$ of $\frac{4}{5}$?
 14. How much is $\frac{5}{8}$ of $\frac{24}{10}$? — $\frac{9}{10}$ of $\frac{10}{11}$? — $\frac{2}{3}$ of $\frac{4}{5}$?
 15. How much is $\frac{5}{4}$ of $\frac{8}{15}$? — $\frac{2}{3}$ of $\frac{12}{10}$? — $\frac{7}{8}$ of $6\frac{3}{10}$?

Remark. Reduce $6\frac{3}{10}$ to an improper fraction.

16. How much is $\frac{7}{12}$ of $1\frac{4}{10}$ dollars?
 17. How much $\frac{3}{4}$ of $3\frac{3}{8}$ cords of wood?
 18. How much is $\frac{1}{4}$ of $8\frac{1}{2}$ bushels of corn?
 19. How much is $\frac{2}{3}$ of $5\frac{1}{2}$ pounds of butter?
 20. How much is $\frac{4}{5}$ of $7\frac{1}{12}$ feet?
 21. A man gave $\frac{1}{2}$ of $4\frac{1}{2}$ bushels of corn for 2 barrels of flour; how many bushels of corn did the flour cost him? How many bushels did 1 barrel cost him?

LESSON XXIV.*

1. A mother divided $\frac{1}{2}$ of a pie equally among 4 children; what part of the pie did she give to each?

SOLUTION. — 1 child received $\frac{1}{4}$ as much as 4 children; since 4 children received $\frac{1}{2}$ of a pie, 1 child received $\frac{1}{4}$ of $\frac{1}{2}$ of a pie; multiplying both terms of $\frac{1}{4}$ by 4, reduces it to $\frac{1}{4}$, and $\frac{1}{4}$ of $\frac{1}{4}$ is $\frac{1}{16}$. Therefore, each child received $\frac{1}{16}$ of the pie.

2. Paid $\frac{1}{4}$ of a dollar for a horse to drive 3 miles; how much was that a mile?

3. If 3 men eat $\frac{1}{2}$ of a loaf of bread at one meal, how much will 1 man eat?

4. Paid $\frac{1}{2}$ of a shilling for 8 sheets of writing paper; how much was that a sheet?

5. If $\frac{1}{4}$ of an acre of land will produce 5 bushels of wheat, what part of an acre will produce 1 bushel?

6. A man paid 5 dollars for $\frac{1}{5}$ of a barrel of flour; what part of a barrel will 1 dollar buy at the same rate?

SOLUTION. — 1 dollar will buy $\frac{1}{5}$ as much as 5 dollars; since 5 dollars will buy $\frac{1}{5}$ of a barrel, 1 dollar will buy $\frac{1}{5}$ of $\frac{1}{5}$ of a barrel; multiplying both terms of $\frac{1}{5}$ by 5, reduces it to $\frac{1}{25}$, and $\frac{1}{5}$ of $\frac{1}{25}$ is $\frac{1}{125}$. Therefore, 1 dollar will buy $\frac{1}{125}$ of a barrel.

* See Note 17.

7. A man, owning $\frac{3}{4}$ of a ship, sold $\frac{1}{4}$ of his share; what part of the whole ship did he sell?

8. A woman bought $\frac{3}{4}$ of a pound of tea, at $\frac{1}{3}$ of a dollar a pound; how much did it cost her?

9. If $\frac{1}{4}$ of a melon be divided equally among 9 boys, what part of the melon will 1 boy have? 5 boys?

10. If 2 boys can earn $\frac{2}{3}$ of a dollar a day, how much can 1 boy earn? 3 boys? 8 boys? 10 boys?

11. If 4 yards of cambric cost $\frac{3}{10}$ of a dollar, how much will 7 yards cost? 10 yards? 12 yards?

12. How much is $\frac{1}{2}$ of $\frac{1}{2}$?

SOLUTION. Multiplying both terms of $\frac{1}{2}$ by 2, reduces it to $\frac{2}{2}$, and $\frac{1}{2}$ of $\frac{2}{2}$ is $\frac{1}{2}$. Therefore, $\frac{1}{2}$ of $\frac{1}{2}$ is $\frac{1}{4}$.

13. How may this operation be contracted?

Ans. By multiplying the denominator of $\frac{1}{2}$ by 2.

14. How much is $\frac{3}{8}$ of $\frac{1}{4}$?

15. How may this operation be shortened?

Ans. By multiplying the denominators of the fractions together for a new denominator, and the numerators for a new numerator.

16. What is the operation called?

Ans. It is called multiplying a fraction by a fraction.

17. How is a fraction multiplied by a fraction?

18. When fractions are connected by the word of, what are they called?

Ans. They are called Compound Fractions.

19. What is $\frac{3}{4}$ of $\frac{2}{10}$ called, and what does it signify?

Ans. It is called a compound fraction, and signifies that $\frac{3}{4}$ of $\frac{2}{10}$ is to be taken; or, that $\frac{2}{10}$ is to be multiplied by $\frac{3}{4}$.

20. Then, how are compound fractions reduced to simple ones?

Ans. In the same manner that two fractions are multiplied together.

21. How much is $\frac{3}{4}$ of $\frac{2}{10}$? — $\frac{1}{2}$ of $\frac{3}{4}$?

22. How much is $\frac{3}{4}$ of $\frac{1}{2}$? — $\frac{1}{2}$ of $\frac{3}{4}$? — $\frac{2}{11}$ of $\frac{1}{12}$?

23. How much is $\frac{1}{2}$ of $\frac{1}{2}$ of $\frac{1}{2}$? — $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{1}{10}$?

LESSON XXV.

1. A man bought $4\frac{1}{2}$ yards of cloth, at $2\frac{1}{2}$ dollars a yard; how much did it cost him?

SOLUTION. 4 yards cost 4 times as much as 1 yard;

since 1 yard cost $2\frac{1}{2}$ dollars, 4 yards cost 4 times $2\frac{1}{2}$ dollars; 4 times 2 dollars = 8 dollars, and 4 times $\frac{1}{2}$ of a dollar = $\frac{1}{2}$ of a dollar, or $1\frac{1}{2}$ dollars, which added to 8 dollars makes $9\frac{1}{2}$ dollars, the cost of 4 yards; $\frac{1}{2}$ of a yard cost $\frac{1}{2}$ as much as 1 yard; $\frac{1}{2}$ of 2 dollars = 1 dollar, and $\frac{1}{2}$ of $\frac{1}{2}$ of a dollar = $\frac{1}{4}$ of a dollar, which added to 1 dollar makes $1\frac{1}{4}$ dollars, the cost of $\frac{1}{2}$ of a yard; then, $9\frac{1}{2}$ dollars + $1\frac{1}{4}$ dollars = $10\frac{3}{4}$ dollars. Therefore, $4\frac{1}{2}$ yards of cloth, at $2\frac{1}{2}$ dollars a yard, cost $10\frac{3}{4}$ dollars.

2. How may the above operation be shortened?

Ans. By reducing the mixed numbers to improper fractions, thus: $4\frac{1}{2}$ yards = $\frac{9}{2}$ of a yard, and $2\frac{1}{2}$ dollars = $\frac{5}{2}$ of a dollar; then, since 1 yard cost $\frac{5}{2}$ of a dollar, $\frac{9}{2}$ of a yard will cost $\frac{9}{2}$ of $\frac{5}{2}$ of a dollar; $\frac{9}{2}$ of $\frac{5}{2}$ of a dollar = $\frac{45}{4}$ of a dollar, or $10\frac{3}{4}$ dollars. Therefore, $4\frac{1}{2}$ yards of cloth, at $2\frac{1}{2}$ dollars a yard, cost $10\frac{3}{4}$ dollars.

3. From the last operation may be derived the method of multiplying a mixed number by a mixed number; what is it?

4. Multiply $4\frac{1}{2}$ by $5\frac{3}{4}$. — $6\frac{1}{2}$ by $2\frac{3}{4}$. — $4\frac{5}{10}$ by $\frac{1}{2}$.
5. Multiply $6\frac{3}{4}$ by $\frac{7}{10}$. — $4\frac{1}{2}$ by $2\frac{1}{4}$. — $10\frac{3}{4}$ by $\frac{5}{12}$.
6. How much is $\frac{1}{2}$ of $\frac{3}{4}$? — $\frac{1}{3}$ of $\frac{2}{5}$? — $\frac{3}{5}$ of $\frac{2}{3}$?
7. How much is $\frac{2}{3}$ of $\frac{1}{8}$? — $\frac{1}{4}$ of $\frac{1}{5}$? — $\frac{1}{2}$ of $\frac{1}{4}$?
8. How much is $\frac{1}{2}$ of $\frac{2}{3}$? — $\frac{2}{3}$ of $\frac{2}{3}$? — $\frac{1}{4}$ of $\frac{3}{4}$?
9. How much is $\frac{1}{2} \times \frac{3}{4}$? — $9 \times \frac{2}{3}$? — $\frac{3}{4} \times 9$?
10. How much is $\frac{2}{3} \times \frac{1}{2} \times \frac{4}{5}$? — $\frac{3}{4} \times \frac{1}{2} \times \frac{2}{3}$?
11. How much is $\frac{2}{3} \times \frac{1}{2} \times \frac{5}{7} \times \frac{1}{11}$? — $3\frac{1}{2} \times 4\frac{3}{4}$?
12. How much is $6 \times 2\frac{1}{2}$? — $3\frac{1}{2} \times 5$?
13. How much is $5\frac{3}{4} \times 8$? — $3\frac{3}{4} \times 2\frac{1}{2}$?
14. How much is $12\frac{1}{2} \times 3\frac{1}{2}$? — $\frac{1}{2} \times 3\frac{1}{2} \times \frac{1}{2}$?
15. How much is $\frac{1}{3}$ of $8 \times \frac{1}{4}$ of 12?
16. How much is $\frac{2}{3}$ of $3 \times \frac{1}{4}$ of 2?
17. How much is $\frac{1}{2}$ of $\frac{3}{4}$ of $4 \times 5\frac{1}{2}$?
18. How much is $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{2}{3}$?
19. How much is $\frac{1}{4}$ of $12 \times \frac{3}{4}$ of 1?
20. How much is $\frac{1}{2}$ of $\frac{1}{3}$ of $\frac{1}{4}$ of $\frac{1}{5}$?
21. How much is $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{4}{5}$?

LESSON XXVI.

1. A druggist bought 4 pounds of opium, at $6\frac{3}{4}$ dollars a pound; how much did he pay for it?

2. If a man can build $5\frac{3}{4}$ rods of stone wall in 1 day, how many rods can he build in 8 days?

3. Bought 16 pounds of lard, at $\frac{3}{5}$ of a dollar a pound; how much did it cost me?

4. Sold 20 pounds of wool, at $\frac{7}{10}$ of a dollar a pound; how much did it come to?

5. A man gave $\frac{7}{8}$ of a dollar for a pair of shoes, and 5 times as much for a pair of boots; how much did he pay for the boots? How much for the boots and shoes?

6. If a horse eat $1\frac{1}{8}$ of a bushel of oats in 1 day, how many bushels will he eat in a week?

7. Sold 3 yards of oilcloth, at $1\frac{3}{10}$ dollars a yard; how much did I receive for it?

8. Bought 7 white-fish, each weighing $2\frac{1}{2}$ pounds; how much did they all weigh?

9. How much must be given for $8\frac{1}{4}$ quarts of strawberries, at 10 cents a quart?

10. Edson had 32 marbles, and gave $\frac{3}{4}$ of them for 12 apples; how many marbles did 1 apple cost him?

11. A farmer, having 40 sheep, gave $\frac{3}{10}$ of them for 2 cows; how many sheep did one cow cost him?

12. A man dug 80 bushels of potatoes, and took $\frac{3}{10}$ of them in payment for his labor; how many bushels was that?

13. If 9 bushels of oats are worth $3\frac{1}{2}$ dollars, how much is 1 bushel worth?

14. A man sold 3 cows, for 12 dollars apiece, and took $\frac{1}{3}$ of his pay in broadcloth, at 3 dollars a yard, and the balance in money; how many yards of broadcloth did he receive? How much money?

15. How many yards of calico, at 10 cents a yard, must be given for $6\frac{3}{4}$ pounds of cheese, at 7 cents a pound?

16. If 8 bushels of corn are worth $3\frac{1}{10}$ dollars, how much is 1 bushel worth?

17. If 3 yards of ribbon cost $\frac{1}{4}$ of a dollar, how much will 5 yards cost?

18. A man, having $2\frac{1}{10}$ bushels of grass seed, sowed $\frac{3}{4}$ of it; how much had he left?

19. Julia, having $1\frac{1}{8}$ of a yard of satin ribbon, used $\frac{1}{4}$ of it for bonnet strings; what part of a yard did she use?

20. Alonzo, having $\frac{3}{4}$ of a pint of walnuts, gave $\frac{1}{2}$ of them to his brother William; what part of a pint did William have?

21. A man, having $\frac{2}{3}$ of a dollar, gave $\frac{1}{3}$ of his money for a bushel of apples; how much did the apples cost him?

22. A horse traveled $\frac{1}{2}$ of $\frac{3}{4}$ of 18 miles in half an hour; how many miles was that an hour?

23. Barnard had $\frac{3}{4}$ of a bushel of walnuts, and he gave $\frac{1}{3}$ of $\frac{1}{4}$ of them for a pair of skates; what part of a bushel did the skates cost him? What part of a bushel had he left?

24. Bought $6\frac{3}{4}$ bushels of wheat, at $1\frac{1}{2}$ dollars a bushel; how much did it cost me?

25. A confectioner sold $\frac{3}{4}$ of $10\frac{1}{2}$ pounds of candy, at $\frac{2}{3}$ of a dollar a pound; how much did he receive for it?

26. Enos, having $\frac{2}{3}$ of $\frac{1}{2}$ of a bushel of apple seeds, sold $\frac{1}{3}$ of $\frac{2}{3}$ of them; what part of a bushel did he sell? What part of a bushel had he left?

27. A clothier bought $\frac{3}{4}$ of $13\frac{1}{2}$ pounds of indigo, at $\frac{2}{3}$ of $2\frac{1}{2}$ dollars a pound; how much did it cost him?

LESSON XXVII.

1. A man paid $\frac{2}{3}$ of dollar for 2 yards of cloth; how much was that a yard?

SOLUTION. 1 yard cost $\frac{1}{2}$ as much as 2 yards; since 2 yards cost $\frac{2}{3}$ of a dollar, 1 yard cost $\frac{1}{2}$ of $\frac{2}{3}$ of a dollar, which is $\frac{1}{3}$ of a dollar. Therefore, the cloth was $\frac{1}{3}$ of a dollar a yard.

2. A cow consumed $\frac{3}{4}$ of a bushel of meal in 3 days; how much was that a day?

3. Paid $2\frac{1}{2}$ dollars for 7 days' board; how much was that a day?

Remark. Reduce $2\frac{1}{2}$ to fifths.

4. A boy gave $1\frac{1}{2}$ shillings for 5 oranges; how much were they apiece?

5. If 7 pounds of wool cost $1\frac{1}{2}$ dollars, how much will 1 pound cost?

6. Paid $\frac{3}{4}$ of a dollar for 2 gallons of molasses; how much was that a gallon?

7. Sold 15 pounds of butter for $2\frac{3}{11}$ dollars; how much was it a pound?

8. A man spent $2\frac{5}{8}$ dollars in three days; how much was that a day?

9. If 3 apples be equally divided among 9 boys, what part of an apple will each boy have? If $1\frac{1}{4}$ apples? If $6\frac{1}{2}$ apples?

10. A mother gave to her daughter $1\frac{5}{16}$ apples, and to her son $\frac{1}{3}$ as much; what part of an apple did the son receive?

11. A man paid $5\frac{3}{4}$ dollars for a barrel of flour, and $\frac{1}{12}$ as much for a bushel of corn; how much did the corn cost him?

12. A man bought a hat and a cap; for the hat he paid $4\frac{3}{8}$ dollars, and for the cap $\frac{1}{5}$ as much; how much did the cap cost him?

13. A man paid $4\frac{1}{2}$ dollars for 6 bushels of peas; how much did they cost him a bushel?

14. If 10 pounds of butter buy $1\frac{4}{5}$ pounds of tea, how much tea will 1 pound of butter buy?

15. If 20 pounds of lard cost $1\frac{7}{15}$ dollars, how much will 1 pound cost?

16. A butcher sold a quarter of veal weighing 13 pounds, for $\frac{1}{3}$ of a dollar; how much was that a pound?

17. If it takes $9\frac{5}{8}$ yards of satin to make 11 vests, how much will it take to make 1 vest?

18. A horse consumed $2\frac{1}{2}$ tons of hay in 6 months; how much would last him 1 month, at the same rate?

19. A man pastured 80 sheep on 12 acres of ground; what part of an acre was that to a sheep?

20. A carpenter earned $9\frac{3}{4}$ dollars in a week; how much was that a day?

21. A milkman sold 50 quarts of milk for 2 dollars; how much was that a quart?

22. If it takes $2\frac{3}{8}$ barrels of flour to last 20 persons 2 months, how much will it take to last 1 person the same time?

23. Twelve horses consume 9 bushels of oats in a day; how much does 1 horse consume?

24. If a breakfast for 12 men costs $3\frac{6}{10}$ dollars, how much will a breakfast for 1 man cost? *How much* for 6 men? — for 15 men?

25. If 9 primers cost $\frac{1}{3}$ of a dollar, how much will 11 primers cost? 15 primers?

LESSON XXVIII.

1. A man traveled $16\frac{1}{4}$ miles in 5 hours; how many miles was that an hour?

SOLUTION. *In 1 hour he traveled $\frac{1}{5}$ as far as he did in 5 hours; since he traveled $16\frac{1}{4}$ miles in 5 hours, in 1 hour he traveled $\frac{1}{5}$ of $16\frac{1}{4}$ miles; 5 is contained in $16\frac{1}{4}$ three times and $1\frac{1}{4}$ over; $1\frac{1}{4} = \frac{5}{4}$, and 5 is contained in $\frac{5}{4}$ 1 fourth of a time, which added to 3 makes $3\frac{1}{4}$. Therefore, he traveled $3\frac{1}{4}$ miles an hour.*

2. Paid $12\frac{1}{4}$ dollars for 7 weeks' board; how much was that a week?

3. Bought 12 sheep for 21 dollars; how much did I pay apiece for them?

4. A farmer sowed 36 bushels of wheat on 20 acres of ground; how many bushels was that to an acre?

5. A man plowed $13\frac{3}{8}$ acres of ground in 8 days; how many acres was that a day?

6. If 9 barrels of flour cost $43\frac{7}{8}$ dollars, how much will 1 barrel cost?

7. A tailor used $19\frac{3}{4}$ yards of broadcloth in making 6 cloaks; how many yards did each cloak contain?

8. A drover paid $86\frac{1}{2}$ dollars for 7 cows; how much did he pay apiece for them?

9. An innkeeper paid $76\frac{3}{4}$ dollars for 8 firkins of butter; how much was it a firkin?

10. How many days will it take 10 men to do as much work as 1 man can do in 57 days?

11. A stationer sold 12 bunches of quills for 75 cents; how much were they a bunch?

12. *How many times* is 9 contained in $74\frac{7}{10}$? — is 5 contained $62\frac{1}{2}$? — is 8 contained in $163\frac{1}{2}$?

13. *Divide* $8\frac{1}{10}$ by 9. — $2\frac{1}{2}$ by 4. — 7 by 12. — $1\frac{3}{5}$ by 3.

14. Bought 5 pounds of tea and 15 pounds of sugar for 5 dollars; the tea cost $3\frac{1}{2}$ dollars; how much did the sugar cost? How much a pound?

15. Paid $16\frac{3}{4}$ dollars for 10 yards of carpeting and 7 yards of oilcloth; the carpeting was $\frac{3}{4}$ of a dollar a yard; how much was the oilcloth a yard?

16. A lady paid $9\frac{3}{4}$ dollars for 12 yards of silk; how much was the silk a yard?

17. A hatter sold 8 silk hats and 4 fur hats for $55\frac{1}{4}$ dollars; the fur hats were $5\frac{3}{8}$ dollars apiece; what was the price of the silk hats?

18. A shoemaker sold 6 pairs of calf boots for $28\frac{3}{4}$ dollars, and 8 pairs of morocco boots for 52 dollars; *what was the price of a pair of the calf boots?* — of the morocco boots? How much did 1 pair of the calf boots and 1 pair of the morocco boots come to?

19. From $66 \div 12$ take $12\frac{1}{2} \div 5$.

LESSON XXIX.*

1. If $\frac{3}{4}$ of a piece of cloth is worth 27 dollars, how much is $\frac{1}{4}$ of it worth? How much is the whole piece worth?

SOLUTION. $\frac{1}{4}$ of the piece is worth $\frac{1}{3}$ as much as $\frac{3}{4}$ of it; if $\frac{3}{4}$ of it is worth 27 dollars, $\frac{1}{4}$ of it is worth $\frac{1}{3}$ of 27 dollars, which are 9 dollars. Therefore, $\frac{1}{4}$ of the piece is worth 9 dollars. Then, in the whole piece there are $\frac{4}{4}$; $\frac{4}{4}$ are worth 4 times as much as $\frac{1}{4}$; if $\frac{1}{4}$ is worth 9 dollars, $\frac{4}{4}$ are worth 4 times 9 dollars, which are 36 dollars. Therefore, if $\frac{3}{4}$ of a piece of cloth is worth 27 dollars, the whole piece is worth 36 dollars.

2. A lady bought a silk dress for 30 dollars, and it cost her $\frac{2}{3}$ of all the money she had; how much money had she?

Remark. First find $\frac{1}{3}$ her money by dividing 30 dollars by 3, then find $\frac{2}{3}$, or the whole of it, by multiplying $\frac{1}{3}$ of it by 5.

3. Paid 4 dollars for $\frac{2}{3}$ of a barrel of sugar; how much was $\frac{1}{3}$ of a barrel worth? What was the whole barrel worth?

4. If $\frac{3}{4}$ of an acre of land is worth 16 dollars, how much is $\frac{1}{4}$ of an acre worth? What is an acre worth?

5. If $\frac{3}{4}$ of a barrel of flour is worth 6 dollars, how much is $\frac{1}{4}$ of a barrel worth? What is a barrel worth?

6. If $\frac{3}{4}$ of a pound of tea is worth 56 cents, how much is $\frac{1}{4}$ of a pound worth? What is a pound worth?

* See Note 16.

7. Robert went to the circus, and spent 80 cents, which was $\frac{2}{3}$ of all the money he had when he left home; how much money had he when he left home?

8. 14 is $\frac{2}{3}$ of what number?

SOLUTION. $\frac{1}{3}$ of any thing or number is $\frac{1}{2}$ as much as $\frac{2}{3}$ of the same thing or number; since 14 is $\frac{2}{3}$ of some number, $\frac{1}{3}$ of 14 is $\frac{1}{2}$ of the same number; $\frac{1}{3}$ of 14 is 7, and 7 is $\frac{1}{2}$ of 3 times 7, which are 21. Therefore, 14 is $\frac{2}{3}$ of 21.

9. 49 is $\frac{7}{8}$ of what number?

10. 90 is $\frac{9}{11}$ of what number?

11. 54 is $\frac{3}{4}$ of what number?

12. 60 is $\frac{4}{5}$ of what number?

13. 30 is $\frac{3}{10}$ of what number?

14. 48 is $\frac{8}{9}$ of what number?

15. 16 is $\frac{1}{3}$ of what number?

16. 16 is $\frac{2}{3}$ of what number?

17. A man sold $25\frac{2}{3}$ acres of land, which was $\frac{1}{5}$ of all the land he had; how much land had he?

SOLUTION. Since $25\frac{2}{3}$ acres are $\frac{1}{5}$ of the whole number of acres, $\frac{1}{5}$ of $25\frac{2}{3}$ acres must be $\frac{1}{5}$ of the whole number of acres; $\frac{1}{5}$ of $25\frac{2}{3}$ acres is $6\frac{2}{3}$ acres; then, $6\frac{2}{3}$ acres is $\frac{1}{5}$ of 5 times $6\frac{2}{3}$ acres, which are 32 acres. Therefore, he had 32 acres.

18. If 3 bushels of clover seed cost $22\frac{1}{2}$ dollars, how much will 1 bushel cost? 5 bushels?

19. If 3 yards of cloth cost $14\frac{1}{4}$ dollars, how much will 1 yard cost? 4 yards?

20. Paid $5\frac{1}{2}$ dollars for 5 bushels of wheat; how much was that a bushel? How much for 9 bushels?

21. If 5 lemons cost $15\frac{1}{2}$ cents, how much will 6 lemons cost?

22. If 4 pounds of sugar cost $37\frac{1}{2}$ cents, how much will 9 pounds cost?

23. If 8 quarts of chestnuts cost $53\frac{1}{2}$ cents, how much will 3 quarts cost?

24. A man sold a cow for $21\frac{1}{2}$ dollars, which was $\frac{1}{4}$ of what she cost him; how much did she cost him?

25. If 12 yards of cloth cost $7\frac{2}{3}$ dollars, how much will 7 yards cost?

26. $11\frac{1}{2}$ is $\frac{3}{4}$ of what number?

27. $15\frac{1}{2}$ is $\frac{5}{8}$ of what number?

28. 42 is $\frac{7}{10}$ of what number?

29. $25\frac{1}{2}$ is $\frac{3}{4}$ of what number?

30. $36\frac{1}{2}$ is $\frac{7}{8}$ of what number?
31. $9\frac{1}{2}$ is $\frac{1}{6}$ of what number?
32. 96 is $\frac{1}{6}$ of what number?
33. $17\frac{1}{2}$ is $\frac{2}{3}$ of what number?
34. $22\frac{1}{2}$ is $\frac{7}{8}$ of what number?

LESSON XXX.

1. Albert bought $9\frac{1}{2}$ ounces of candy, at 3 cents an ounce, and paid out $\frac{7}{8}$ of all the money he had; how much money had he?

SOLUTION. First find the cost of the candy; $9\frac{1}{2}$ ounces cost $9\frac{1}{2}$ times as much as 1 ounce; since 1 ounce cost 3 cents, $9\frac{1}{2}$ ounces cost $9\frac{1}{2}$ times 3 cents, which are 28 cents; then, since 28 cents is $\frac{7}{8}$ of his money, $\frac{1}{8}$ of 28 cents must be $\frac{1}{8}$ of his money; $\frac{1}{8}$ of 28 cents is 4 cents, and 4 cents are $\frac{1}{9}$ of 9 times 4 cents, which are 36 cents. Therefore, he had 36 cents.

2. A man bought 7 yards of broadcloth, at $3\frac{3}{4}$ dollars a yard, and expended $\frac{5}{8}$ of all the money he had; how much money had he?

3. A man sold a horse for a certain sum, and took in part payment $9\frac{1}{2}$ barrels of flour, at 5 dollars a barrel; the flour came to $\frac{7}{12}$ of the price of the horse; for how much did he sell the horse?

4. A girl bought $4\frac{1}{2}$ yards of muslin, at 10 cents a yard, which cost $\frac{2}{3}$ of all the money she had; how much money had she?

5. A man, having a journey to perform, traveled $3\frac{1}{2}$ miles an hour for 6 hours, and then found that he had performed just $\frac{2}{3}$ of the journey; how long was the journey?

6. A tailor earned a certain sum of money; $\frac{4}{5}$ of this money he had received for making 12 coats, at $3\frac{1}{2}$ dollars apiece; how much money had he earned in all?

7. A stationer, having a quantity of sealing-wax, sold $\frac{4}{5}$ of it for 36 cents, at 4 cents a stick; how many sticks had he at first?

8. 3 times $9\frac{1}{2}$ are $\frac{7}{8}$ of what number?

9. 4 times $3\frac{3}{4}$ are $\frac{2}{3}$ of what number?

10. 5 times $7\frac{1}{5}$ are $\frac{2}{3}$ of what number?
11. 7 times $2\frac{2}{3}$ are $\frac{4}{5}$ of what number?
12. 4 times $4\frac{1}{5}$ are $\frac{2}{5}$ of what number?
13. 12 times $3\frac{1}{2}$ are $\frac{7}{11}$ of what number?
14. 6 times $8\frac{1}{6}$ are $\frac{5}{7}$ of what number?
15. 2 times $12\frac{1}{2}$ are $\frac{7}{8}$ of what number?
16. 7 times $9\frac{1}{6}$ are $\frac{8}{11}$ of what number?
17. 10 times $8\frac{1}{10}$ are how many times $\frac{1}{3}$ of 27?
18. 8 times $11\frac{3}{8}$ are how many times $\frac{3}{5}$ of 20?
19. 9 times $3\frac{3}{4}$ are how many times $\frac{2}{3}$ of 14?
20. 7 times $3\frac{3}{4}$ are $\frac{3}{8}$ of how many times 5?
21. 11 times $5\frac{1}{11}$ are $\frac{7}{8}$ of how many times 7?
22. 6 times $5\frac{1}{2}$ are $\frac{1}{12}$ of how many times 3?
23. 4 times $10\frac{1}{2}$ are $\frac{4}{7}$ of how many times 8?
24. 12 times $1\frac{7}{12}$ is $\frac{1}{3}$ of how many times 6?
25. 3 times $8\frac{1}{3}$ are $\frac{2}{3}$ of how many times 11?

LESSON XXXI

1. A man divided 9 dollars among some poor persons, giving them $\frac{3}{4}$ of a dollar each; how many received the money?

SOLUTION. Since he gave $\frac{3}{4}$ of a dollar to 1 person, he gave 9 dollars to as many persons as the number of times $\frac{3}{4}$ of a dollar are contained in 9 dollars; 9 dollars = $3\frac{3}{4}$ of a dollar, and 3 fourths are contained in 36 fourths 12 times. Therefore, he gave the money to 12 persons.

2. A man divided 7 apples among a number of children, giving them $\frac{1}{2}$ of an apple apiece; among how many children did he divide the apples?

3. How many times can a jug holding $\frac{2}{3}$ of a gallon, be filled from a cask containing 20 gallons of molasses?

4. I paid 4 dollars for barley, at $\frac{4}{5}$ of a dollar a bushel; how many bushels did I buy?

5. I expended 6 dollars in tin pails, at $\frac{2}{3}$ of a dollar apiece; how many pails did I buy?

6. I fed my horse 10 bushels of oats, at the rate of $\frac{5}{8}$ of a bushel a day; how many days did they last him?

7. At $\frac{2}{3}$ of a dollar a yard, how much cloth can be bought for 12 dollars?

8. At $\frac{3}{4}$ of a shilling a pound, how many pounds of mackerel can be bought for 10 shillings?

9. At $\frac{1}{10}$ of a dollar a pound, how many pounds of feathers can be bought for 6 dollars?

10. If a man drink $\frac{1}{8}$ of a gallon of beer in 1 week, how many weeks will 3 gallons last him?

SOLUTION. Since $\frac{1}{8}$ of a gallon last him 1 week, 3 gallons will last him as many weeks as the number of times $\frac{1}{8}$ of a gallon are contained in 3 gallons; $3 \text{ gallons} = \frac{24}{8}$ of a gallon, and 9 sixteenths are contained in 48 sixteenths $5\frac{3}{4}$ or $5\frac{1}{2}$ times. Therefore, it will last him $5\frac{1}{2}$ weeks.

11. If $\frac{1}{4}$ of a barrel of flour will last a family 1 month, how long will 5 barrels last them?

12. If a printer uses $\frac{2}{10}$ of a ream of paper in 1 day, how many days will 10 reams last him?

13. At $\frac{1}{10}$ of a dollar a pound, how many pounds of carpet yarn can be bought for 5 dollars?

14. At $\frac{5}{8}$ of a dollar a pound how many pounds of saddlers' thread can be bought for 3 dollars?

15. A boy gathered 20 bushels of apples in a basket which held $\frac{3}{4}$ of a bushel; how many times did he fill the basket?

16. If $\frac{3}{8}$ of a barrel of pork will last a family 1 month, how many months will 3 barrels last them?

17. Joseph commenced reading his Bible, and read $\frac{3}{10}$ of it in 1 week; how many weeks would he be in reading it through at that rate?

18. Jane went $\frac{3}{4}$ of the way through her Primary Arithmetic in 1 month; how many months would it take her to go through it at that rate?

19. How many times are $\frac{3}{8}$ contained in 8?

20. How many times are $\frac{3}{8}$ contained in 6?

21. How many times are $\frac{1}{12}$ contained in 1? — in 5?

22. Divide 9 by $\frac{1}{4}$. — 11 by $\frac{1}{10}$. — 20 by $\frac{1}{2}$.

23. Divide 10 by $\frac{1}{8}$. — by $\frac{3}{8}$. — by $\frac{1}{10}$.

24. Divide 4 by $\frac{1}{4}$. — by $\frac{3}{8}$. — by $\frac{1}{10}$.

25. Divide 7 by $\frac{1}{4}$. — by $\frac{3}{8}$. — by $\frac{1}{10}$.

26. Divide 12 by $\frac{3}{8}$. — by $\frac{1}{4}$. — by $\frac{1}{10}$.

LESSON XXXII.

1. If $1\frac{1}{4}$ tons of coal make 1 load, how many loads will 10 tons make?

Remark. Reduce the numbers to improper fractions.

2. How many cords of wood can you buy for 15 dollars, at $2\frac{1}{2}$ dollars a cord?

3. *How many tons* of plaster can be bought for 20 dollars, at $3\frac{1}{2}$ dollars a ton? — at $2\frac{3}{4}$ dollars?

4. If $1\frac{3}{8}$ pounds of wool will make 1 yard of cloth, how many yards can be made from 12 pounds?

5. A man paid 8 dollars for $2\frac{5}{8}$ bunches of shingles; how much were they a bunch?

6. If 9 shillings will buy 4 doz. lemons, how many shillings will buy 1 doz.?

7. *How many times* is $4\frac{1}{2}$ contained in 16? — is $2\frac{3}{4}$ contained in 12? — is $3\frac{1}{2}$ contained in 15?

8. *How many times* is $5\frac{1}{2}$ contained in 8? — is $2\frac{1}{4}$ contained in 5? — is $2\frac{3}{4}$ contained in 11?

9. How many bushels of oats can be bought for $8\frac{4}{5}$ dollars, at $\frac{2}{5}$ of a dollar a bushel?

Remark. Reduce $8\frac{4}{5}$ to fifths.

10. If $\frac{2}{11}$ of a bushel of shorts are obtained from 1 bushel of wheat, how many bushels of shorts will be obtained from $6\frac{5}{11}$ bushels of wheat?

11. If $\frac{2}{5}$ of a hogshead of water will carry a mill 1 minute, how many minutes will $10\frac{1}{2}$ hogsheads carry it?

12. In a certain dye, $\frac{5}{12}$ of a pound of copperas is used to every gallon of water; how many pounds of copperas are used to $4\frac{7}{12}$ gallons of water?

13. A blacksmith used $\frac{3}{4}$ of a pound of iron in making 1 dozen horse-shoe nails; how many dozens could he make from $8\frac{1}{4}$ pounds of iron?

14. How many quires of paper can be bought for $10\frac{3}{4}$ shillings, at $1\frac{3}{4}$ shillings a quire?

Remark. Reduce both the numbers to improper fractions.

15. Paid out $26\frac{1}{2}$ dollars for flour, at $4\frac{1}{2}$ dollars a barrel; how many barrels did I buy?

16. A certain family uses $2\frac{3}{4}$ pounds of sugar in 1 week; how many weeks will $20\frac{1}{4}$ pounds last them?

17. If $4\frac{1}{2}$ pounds of butter last a family 1 week, how many weeks will $19\frac{1}{2}$ pounds last them?

18. A founder uses $2\frac{3}{4}$ tons of coal in 1 month; how many months will $18\frac{1}{4}$ tons last him?

19. *How much* is $9\frac{3}{4} \div 3\frac{1}{4}$? — $16\frac{1}{2} \div 2\frac{1}{2}$?

20. *How much* is $12\frac{1}{2} \div 1\frac{3}{4}$? — $24\frac{3}{4} \div 2\frac{1}{4}$?

21. *How much is* $18\frac{1}{2} \div 1\frac{1}{2} ? - 12\frac{3}{4} \div \frac{1}{2} ?$

22. *How much is* $21 \div \frac{2}{3} ? - 15\frac{3}{4} \div 4 ? - 11\frac{1}{2} \div \frac{1}{3} ?$

LESSON XXXIII.

1. A man, having $\frac{3}{4}$ of a dollar, paid it out for caps, at $\frac{1}{2}$ of a dollar apiece; how many caps did he buy?

2. How many meals of victuals can be had for $\frac{3}{4}$ of a dollar, at $\frac{1}{4}$ of a dollar a meal?

3. A blacksmith received $\frac{3}{4}$ of a dollar for setting horse-shoes, at $\frac{1}{8}$ of a dollar apiece; how many shoes did he set?

4. Paid $\frac{1}{2}$ of a dollar for $\frac{1}{2}$ of a bushel of apples; how much were the apples a bushel?

5. If $\frac{3}{10}$ of an acre will pasture 1 sheep, how many sheep will $\frac{9}{10}$ of an acre pasture?

6. A man paid $\frac{2}{3}$ of a dollar for a bushel of potatoes, and expended $\frac{1}{3}$ of his money; how much money had he?

Remark, $\frac{2}{3}$ of a dollar is $\frac{2}{3}$ of all his money; first find $\frac{1}{3}$ of his money, then $\frac{2}{3}$ of all of it.

7. Rufus has $1\frac{5}{15}$ bushels of chestnuts, and Ezra has $\frac{7}{10}$ as many as Rufus; what part of a bushel has Ezra?

8. $\frac{1}{2}$ is $\frac{1}{3}$ of what number?

9. $\frac{1}{3}$ is $\frac{1}{4}$ of what number?

10. $\frac{1}{4}$ is $\frac{1}{5}$ of what number?

11. $\frac{1}{11}$ is $\frac{2}{3}$ of what number?

12. $\frac{2}{25}$ is $\frac{1}{3}$ of what number?

13. $\frac{1}{10}$ is $\frac{5}{8}$ of what number?

14. $\frac{9}{11}$ is $\frac{9}{10}$ of what number?

15. $\frac{8}{9}$ is $\frac{2}{3}$ of what number?

16. $\frac{1}{10}$ is $\frac{1}{2}$ of what number?

17. $4\frac{8}{10}$ is $\frac{1}{10}$ of what number?

18. $1\frac{1}{10}$ dollars is $\frac{1}{4}$ of how many dollars?

19. $19\frac{1}{2}$ bushels is $\frac{1}{4}$ of how many bushels?

20. $5\frac{8}{12}$ feet is $\frac{1}{3}$ of how many feet?

21. At $\frac{1}{5}$ of a dollar apiece, how many table-cloths can be bought for $6\frac{1}{2}$ dollars?

22. How many linen handkerchiefs can be bought for $9\frac{1}{2}$ dollars, at $\frac{2}{3}$ of a dollar apiece?

23. How many times can I fill a bag, holding $2\frac{3}{4}$ bushels, out of a granary containing $21\frac{1}{2}$ bushels of wheat?

24. How many times can a jug, holding $2\frac{1}{4}$ gallons, be filled from a barrel containing $31\frac{1}{4}$ gallons of vinegar?

LESSON XXXIV.

1. A mother divided $\frac{1}{2}$ of a pie among her children, giving them $\frac{1}{4}$ of a pie apiece; how many children had she?

SOLUTION. Since she gave $\frac{1}{4}$ of a pie to 1 child, she gave $\frac{1}{2}$ of a pie to as many children as the number of times $\frac{1}{4}$ is contained in $\frac{1}{2}$; $\frac{1}{2} = \frac{2}{4}$, and 1 fourth is contained in 2 fourths 2 times. Therefore, she had 2 children.

2. Paid $\frac{1}{4}$ of a dollar for the use of a horse, at the rate of $\frac{1}{12}$ of a dollar a mile; how many miles did I drive him?

Remark. Reduce $\frac{1}{4}$ to twelfths.

3. How many men may be served with $\frac{1}{2}$ of a loaf of bread to dinner, if each man require $\frac{1}{6}$ of a loaf?

4. If $\frac{1}{16}$ of a shilling will buy 1 sheet of paper, how many sheets will $\frac{1}{2}$ of a shilling buy?

5. A man paid 1 dollar for $\frac{7}{8}$ of a barrel of flour; what part of a barrel could he buy for $\frac{1}{2}$ of a dollar, at that rate?

6. A man sold $\frac{3}{4}$ of a ship, which was $\frac{1}{2}$ of what he owned; what part of the ship did he own?

Remark. $\frac{3}{4}$ of the ship is $\frac{1}{2}$ of his share of it.

7. A grocer sold $\frac{3}{10}$ of a cheese, which was $\frac{1}{2}$ of what he had; what part of a cheese had he?

8. A woman paid $\frac{1}{2}$ of a dollar for tea, at $\frac{1}{4}$ of a dollar a pound; how much tea did she purchase?

Remark. Reduce the fractions to a common denominator before dividing.

9. Bought $\frac{3}{4}$ of a pound of gunpowder for $\frac{1}{2}$ of a dollar; how much was it a pound?

10. A man bought $\frac{3}{4}$ of a piece of sheeting for $3\frac{1}{2}$ dollars; how much was the sheeting a piece?

11. If $\frac{3}{4}$ of a gallon of oil costs $\frac{1}{2}$ of a dollar, how much will a gallon cost?

12. If $\frac{3}{4}$ of a bunch of shingles costs $1\frac{1}{2}$ dollars, how much will 1 bunch cost?

13. If $\frac{7}{10}$ of a ton of hay cost $5\frac{1}{2}$ dollars, how much will a ton cost?

14. How many bushels of plums can be bought for $9\frac{3}{4}$ dollars, at $\frac{3}{4}$ of a dollar a bushel?

15. $\frac{2}{3}$ is $\frac{1}{10}$ of what number?

16. $\frac{3}{5}$ is $\frac{1}{10}$ of what number?

17. $\frac{3}{5}$ is $\frac{1}{2}$ of what number?

18. $\frac{1}{4}$ is $\frac{1}{2}$ of what number?

19. $\frac{1}{10}$ is $\frac{1}{2}$ of what number?

20. $\frac{2\frac{1}{4}}{11}$ is $\frac{7}{11}$ of what number?

21. $\frac{5}{21}$ is $\frac{2}{3}$ of $\frac{1}{2}$ of what number?

Remark. Reduce the compound fraction to a simple one.

22. $\frac{1}{5}$ is $\frac{9}{50}$ of what number?

23. $\frac{3}{24}$ is $\frac{1}{2}$ of $\frac{1}{2}$ of what number?

24. $\frac{1}{2}$ of $\frac{1}{2}$ is $\frac{1}{2}$ of $\frac{1}{2}$ of what number?

LESSON XXXV.

1. A man bought $4\frac{1}{2}$ yards of cloth for $10\frac{1}{2}$ dollars; how much did he pay a yard for it?

Remark. $4\frac{1}{2} = \frac{9}{2}$, and $10\frac{1}{2} = \frac{21}{2}$; reduce them to a common denominator.

2. How many times is $4\frac{1}{2}$ contained in 23?

3. How many times is $\frac{1}{2}$ contained in $4\frac{1}{2}$?

4. How many times is $\frac{7}{10}$ contained in $6\frac{2}{5}$?

5. How many times is $2\frac{1}{2}$ contained in $4\frac{1}{2}$?

6. How many times is $\frac{1}{2}$ contained in $\frac{3}{4}$?

7. How many times is $\frac{2}{3}$ contained in $\frac{1}{2}$?

8. How many times is $\frac{1}{10}$ contained in $\frac{1}{2}$?

9. How many times is $\frac{1}{2}$ contained in $\frac{1}{10}$?

10. How many times is $\frac{5}{8}$ contained in $\frac{8\frac{1}{2}}{11}$?

11. How many times is $1\frac{1}{8}$ contained in $2\frac{1}{2}$?

12. How many times is $2\frac{1}{2}$ contained in $1\frac{1}{8}$?

13. How many times is $\frac{1}{8}$ contained in $\frac{3}{8}$?

14. How many times is $\frac{3}{8}$ contained in $\frac{1}{8}$?

15. How many times is $\frac{7}{5}$ contained in $1\frac{1}{5}$?

16. How many times is $\frac{1}{2}$ contained in $1\frac{1}{2}$?

17. How many times is $6\frac{1}{2}$ contained in 9?

18. How many times is 9 contained in $6\frac{1}{2}$?

19. How many times is $\frac{1}{2}$ of $\frac{1}{2}$ contained in $\frac{3\frac{1}{2}}{4}$?

20. How many times is $\frac{2}{3}$ of $\frac{1}{2}$ of $\frac{7}{11}$ contained in $\frac{3\frac{5}{8}}{8}$?

21. How many times is $2\frac{1}{2}$ contained in 7?

22. How many times is $\frac{2}{3}$ of 3 contained in $1\frac{1}{2}$?

23. How many times is $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{1}{2}$ contained in $\frac{1}{2}$ of $\frac{1}{2}$?

LESSON XXXVI.

1. How many days will it take a man to dig a ditch $41\frac{7}{8}$ rods long, if he dig 4 rods a day?

2. Sold 20 pounds of wool for 7 dollars; how much did I receive a pound for it?

3. A man bought a pair of boots, and a pair of shoes; for the boots he gave 4 dollars, and for the shoes $\frac{1}{2}$ as much; how much did the shoes cost him?

4. A horse consumes $4\frac{1}{8}$ bushels of oats in a week; how much is that a day?

5. How many yards of merino can be bought for $3\frac{9}{10}$ dollars, at $1\frac{3}{10}$ dollars a yard? How many yards at $\frac{7}{10}$ of a dollar a yard? — at $\frac{8}{10}$ of a dollar a yard?

6. How many quarts of strawberries can you buy for $82\frac{1}{2}$ cents, at 10 cents a quart?

7. Anson bought 12 apples for 24 marbles, and on counting what marbles he had left, found that the apples cost him $\frac{1}{2}$ of his marbles; how many marbles had he at first?

8. Farmer A bought of farmer B 2 cows, for which he gave him 6 sheep apiece; on counting the remainder of his sheep, he found that he had $\frac{1}{2}$ of his flock left; how

many sevenths of his flock did he give for the cows? How many sheep had he at first? How many had he left?

9. A laborer received 12 bushels of potatoes for digging a certain number of bushels, what he received being $\frac{3}{10}$ of the whole; how many bushels did he dig?

10. How many pounds of cheese, at 7 cents a pound, must be given for $4\frac{1}{2}$ yards of cambric, at 10 cents a yard?

11. If 9 pounds of paper rags will buy $3\frac{1}{2}$ pounds of sugar, how many pounds of sugar will 12 pounds of paper rags buy?

12. At $1\frac{1}{2}$ dollars for 5 yards of ribbon, how much will three yards cost?

13. A man having a quantity of grass seed, sowed $1\frac{1}{2}$ bushels, and had $\frac{1}{2}$ of his seed left; how much seed had he at first?

Remark. In the whole quantity there were $\frac{3}{2}$; if he had $\frac{1}{2}$ left, he must have sown $\frac{3}{2}$; therefore, $1\frac{1}{2}$ bushels are $\frac{3}{2}$ of what he had at first.

14. A man spent $\frac{1}{2}$ of a dollar, and had $\frac{1}{2}$ of his money left; how much money had he at first?

Remark. $\frac{1}{2}$ of a dollar is $\frac{1}{2}$ of what he had at first.

15. Alonzo gave his brother $\frac{1}{2}$ of an orange, and had left $\frac{1}{2}$ of what he had at first; what part of an orange had he at first?

16. A man gave $2\frac{1}{2}$ of a dollar for a bushel of apples, and paid out $\frac{1}{2}$ of all the money he had; how much money had he at first?

17. A horse traveled $12\frac{1}{2}$ miles in an hour; how far would he travel in $1\frac{1}{2}$ hours at the same rate?

Remark. $1\frac{1}{2}$ hours = $\frac{3}{2}$ of an hour; first find how far he would travel in $\frac{1}{2}$ of an hour, and then in $\frac{3}{2}$ of an hour.

18. Benjamin gave $\frac{5}{8}$ of a bushel of walnuts for a pair of skates, and had $\frac{3}{8}$ of his walnuts left; what part of a bushel had he at first?

19. A confectioner sold 14 pounds of candy for $5\frac{1}{2}$ dollars; how much was it a pound?

20. A clothier bought $8\frac{1}{2}$ pounds of indigo for $20\frac{1}{2}$ dollars; how much was it a pound?

MISCELLANEOUS EXERCISES.*

1. A merchant bought a piece of silk containing 42 yards, and sold $\frac{2}{3}$ of it; how many yards did he sell?

2. He received 29 dollars for what he sold; how much did he get a yard for it?

3. The remainder of the piece he sold for 21 dollars; how much was that a yard?

4. If a hoghead of molasses is worth 20 dollars, how much is $\frac{1}{2}$ of it worth?

5. A farmer sold to 8 men $\frac{1}{2}$ of a bushel of wheat apiece; how many bushels did he sell?

6. If $1\frac{1}{2}$ bushels of potatoes will last a family of 9 persons 1 week, how many bushels will last them 7 weeks?

7. If 2 barrels of flour cost 11 dollars, how much will 5 barrels cost?

8. A man sold a wagon for 36 dollars, which was $\frac{1}{2}$ of what it cost him; how much did it cost him?

9. A man paid $4\frac{1}{2}$ dollars for a barrel of flour, $7\frac{1}{2}$ dollars for a barrel of pork, and $3\frac{1}{2}$ dollars for 50 pounds of sugar; how much money did he expend?

10. How much will 12 pounds of candles come to, at $\frac{1}{4}$ of a dollar a pound?

11. Eight men performed a certain piece of work in $6\frac{7}{8}$ days; how many days would it take one man to do it?

12. If 5 yards of satin costs $8\frac{1}{2}$ dollars, how much will 12 yards cost?

13. A lady, having $15\frac{1}{2}$ dollars, bought 10 yards of bombazin, at $1\frac{1}{2}$ dollars a yard; how much money had she left?

14. A dairy-man, having forty-two pounds of butter, sold $\frac{1}{2}$ of it to an inn-keeper, at $\frac{3}{4}$ of a dollar a pound; how much did he receive for it?

15. A cabinet-maker sold a sofa, a table, and a set of chairs for 56 dollars; he took $\frac{1}{2}$ of his pay in flour, at $5\frac{1}{2}$ dollars a barrel; how many barrels of flour did he receive?

16. He took the remainder in haircloth, at $2\frac{1}{2}$ dollars a yard; how many yards of haircloth did he receive?

17. Byron, having $\frac{1}{2}$ of a dollar, gave $\frac{1}{3}$ of his money for a box of water colors; how much did the water colors cost him?

* See Note 7.

18. A confectioner sold $\frac{1}{4}$ of 12 pounds of candy, at $\frac{3}{10}$ of a dollar a pound; how much did he receive for it?
19. A mother gave her daughter $\frac{1}{3}$ of an apple, and her son $\frac{5}{8}$ as much; what part of an apple did she give her son?
20. A man paid 9 dollars for the Genesee Farmer, at $\frac{1}{4}$ dollar a volume; how many volumes did he purchase?
21. A milliner paid $\frac{1}{4}$ of 67 dollars for a pattern hat; how much did it cost her?
22. Bought 40 yards of sheeting, at $\frac{1}{10}$ of a dollar a yard; how much did it cost me?
23. If $\frac{1}{6}$ of a dollar will pay for 1 day's board, how much will 14 days' board come to?
24. If 2 yards of cloth cost $\frac{4}{5}$ of a dollar, how much will 3 yards cost?
25. A boy, having $\frac{1}{2}$ of an orange, divided it equally between 2 of his companions; what part of an orange did he give to each?
26. If 7 pounds of coffee cost $1\frac{1}{10}$ dollars, how much will 10 pounds cost?
27. Paid $61\frac{1}{4}$ dollars for 9 tons of hay; how much was it a ton?
28. How many bushels of corn can I buy for $11\frac{1}{4}$ dollars, at $\frac{1}{4}$ of a dollar a bushel?
29. A girl, having $\frac{1}{2}$ of a dollar, gave $\frac{1}{4}$ of her money for a pair of gloves; what part of a dollar did the gloves cost her? What part of a dollar had she left?
30. How much will $8\frac{3}{8}$ barrels of cider come to, at 3 dollars a barrel?
31. At $\frac{5}{12}$ of a dollar for building 1 rod of stone wall, how many rods can be built for 15 dollars?
32. If 4 pounds of tobacco cost $\frac{1}{3}$ of a dollar, how much will 7 pounds cost?
33. A man, having 1 dollar, gave $\frac{1}{4}$ of it for his dinner, $\frac{1}{4}$ of it for riding 20 miles, and $\frac{1}{4}$ of it for a palmleaf hat; what part of a dollar had he left?
34. A grocer has $\frac{1}{3}$ of a hogshead of molasses in one cask, and $\frac{1}{3}$ of a hogshead in another; how much more in one cask than in the other? How much in both?
35. If $2\frac{1}{2}$ bushels of oats sow an acre, how many acres will $11\frac{1}{2}$ bushels sow?
36. If $2\frac{1}{10}$ tons of hay will keep one horse through the winter, how many tons will keep 5 horses the same time?
37. If $1\frac{1}{4}$ dollars will pay for making 1 vest, and $5\frac{1}{4}$ dollars will pay for making 1 coat, how much will the making of a coat and a vest come to?
38. If a tailor makes 5 coats and 5 vests in 1 month, and receives the above prices for his work, how much will he earn in a month?

COMPOUND NUMBERS.

LESSON I.*

1. In 1 yard there are 3 feet; how many feet in 5 yards and 2 feet?

SOLUTION. In 5 yards there are 5 times as many feet as there are in 1 yard; since there are 3 feet in 1 yard, in 5 yards there are 5 times 3 feet, which = 15 feet, and 15 feet + 2 feet = 17 feet. Therefore, in 5 yards and 2 feet there are 17 feet.

2. In 1 foot there are 12 inches; how many inches in 3 feet 4 inches?

3. How many yards in 17 feet?

SOLUTION. Since there are 3 feet in 1 yard, in 17 feet there are as many yards as the number of times 3 feet are contained in 17 feet; 3 feet are contained in 17 feet 5 times and 2 over. Therefore, in 17 feet there are 5 yards and 2 feet.

4. How many feet and inches in 40 inches?

5. What is a Compound Number?

Ans. When two or more different names are employed to express one number, it is called a Compound Number.

6. Is 3 yards 2 feet 11 inches a compound number?

Ans. It is, because it expresses length by the different names, yards, feet, and inches.

7. Why is 4 dollars 25 cents a compound number? — 9 hours 15 minutes? — 10 pounds 7 ounces?

8. What is understood by the word Denomination in compound numbers?

Ans. The word Denomination is applied to each of the different names by which a compound number is expressed; it signifies name.

9. What is meant by different denominations?

* See Note 12.

Ans. *Different names in the same compound number are called different denominations.*

10. Give an example.

Ans. *4 hours 10 minutes 25 seconds is a compound number, and the denominations are hours, minutes, and seconds.*

11. What are the denominations in the following numbers; 5 days 14 hours 30 minutes? 20 dollars 15 cents 3 mills? 8 pounds 4 ounces? 12 rods 4 feet 10 inches?

12. In 4 gallons 3 quarts 1 pint 2 gills *what is the denomination of the 4?* — of the 3? — of the 1? — of the 2?

13. What is Reduction of Compound Numbers?

Ans. *It is the method of changing compound numbers from one denomination to another, without altering their value.*

LESSON II.*

Money.

I. FEDERAL MONEY.

Federal Money is the currency or money of the United States. The denominations are eagles, dollars, dimes, cents, and mills.

TABLE.

10 mills	make 1 cent.
10 cents	" 1 dime.
10 dimes (= 100 cents)	" 1 dollar.
10 dollars	" 1 eagle.

NOTE 1. Dimes are usually called tens of cents, and eagles tens of dollars. Hence, Federal Money is calculated in dollars and cents, and accounts are kept in these denominations.

NOTE 2. A character, \$, which may be regarded a contraction of U. S., placed before a number, signifies that it is Federal, or U. S. money.

NOTE 3. When dollars and cents are expressed in the same number, a point, called a separator ('), is placed before the cents; thus, 3 dollars and 51 cents are expressed \$3'51.

1. *How many mills in 2 cents?* — in 7 cents?

2. *How many cents in 2 dimes?* — in 15 dimes?

3. *How many dimes in 4 dollars?* — in 6 dollars?

4. *How many mills in 4 cents and 5 mills?* — in 3½ cents?

5. *How many cents in 1 dollar?* — in 8 dollars? — in 15 dollars? — in 6 dollars? — in 2½ dollars? — in 3¼ dollars? — in 8½ dollars? — in 5⅞ dollars? — in 9⅝ dollars?

6. *How many cents in \$1'25, that is, 1 dollar and 25 cents?* — in \$4'50? — in \$9'06? — in \$15'72?

7. *How many cents in 20 mills?* — in 70 mills?

8. *How many dimes in 20 cents?* — in 160 cents?

9. Reduce 40 dimes to dollars.

10. Reduce 45 mills to cents. — 96 mills. — 57 mills.

11. Reduce 100 cents to dollars. — 300 cents. — 250 cents. — 325 cents. — 918 cents.

12. *What part of a cent is 1 mill?* — are 2 mills? — 3 mills? — 4 mills? — 5 mills? — 6 mills? — 7 mills? — 8 mills? — 9 mills?

13. *What part of a dollar are 5 cents?* — 10 cents? — 25 cents? — 20 cents? 50 cents? — 75 cents? — 93 cents?

14. *What part of a dollar are 3 mills?* — 5 mills? — 8 mills?

II. STERLING OR ENGLISH MONEY.

Sterling or English Money is the currency of Great Britain. The denominations are pounds, shillings, pence, and farthings.

TABLE.

4 farthings (sign, qr.)	make 1 penny,	sign, d.
12 pence	" 1 shilling,	" s.
20 shillings	" 1 pound,	" £.

NOTE 1. Farthings are often written as the fraction of a penny; thus, 1qr. = $\frac{1}{4}$ d., 2qrs. = $\frac{2}{4}$ d., 3qrs. = $\frac{3}{4}$ d.

NOTE 2. There is an English gold coin, called a sovereign, the value of which is £1. A pound sterling is \$4'84.

15. *How many farthings in 6 pence?* — in 2d. 3qrs.? — in 11½d.? — in 8½d.? — in 12 pence or 1 shilling?

* See Note 19.

16. *How many pence in 3 shillings?* — in 5s. 6d. ? — in 3½s. ? — in 5½s. — in 8½s. ?
 17. *How many shillings in 3£.* ? — in 4£. 2s. ? — in 5½£. ? — in 8½£. ?
 18. *How many pence in 20 farthings?* — in 12 farthings ?
 19. *Reduce 11 farthings to pence.* — 41qrs. — 46qrs.
 20. *Reduce 36 pence to shillings.* — 144d. — 39d. — 104d.
 21. *Reduce 60 shillings to pounds.* — 100s. — 82s.
 22. *In 2s. 3d. how many pence?* How many farthings ?
 23. *In 97 farthings how many pence?* How many shillings ?
 24. *What part of a shilling are 2d. ?* — 5d. ? — 6d. ? — 8d. ? — 9d. ? — 11d. ?
 25. *What part of a pound are 2s. ?* — 4s. ? — 5s. ? — 7s. ? — 10s. ? — 11s. ? — 15s. ? — 16s. ? — 18s. ? — 19s. ?
 26. *What part of a shilling are 3qrs. ?*
 27. *What part of a pound is 1d. ?* — are 5d. ?
 28. *What part of a shilling are 3d. 3qrs. ?* — 5½d. ?
 29. *What part of a pound are 5s. 6d. ?*

LESSON III.

Weight.

I. AVOIRDUPOIS WEIGHT.

Avoirdupois Weight is employed in all the ordinary purposes of weighing. The denominations are tons, hundredrs, pounds, ounces, and drams.

TABLE.

16 drams (sign, dr.)	make 1 ounce,	sign, oz.
16 ounces	" 1 pound,	" lb.
100 pounds	" 1 hundred weight,	" cwt.
2240 pounds, or 20 cwt.,	" 1 ton,	" T.

- How many drams in 2 ounces?* — in 5 oz. ? — in 8 oz. ?
- How many ounces in 3 pounds?* — in 6 lbs. ? — in 9 lbs. ?
- How many drams in 2 oz. 5 drs. ?*
- How many ounces in 4½ lbs. ?* — in 2½ lbs. ? — in 7½ lbs. ?
- How many ounces in 32 drams?* — in 80 drs. ?
- How many pounds in 48 oz. ?* — in 64 oz. ? — in 50 oz. ? — in 72 oz. ? — in 30 oz. ?
- Bought a piece of beef, which weighed 5 lbs. 10 oz. ; what was its weight in ounces ?
- In 3 lbs. 15 oz. of tea how many ounces ?
- Bought a load of hay, which weighed 1 T. 4 cwt. 58 lbs. ; how many pounds did it weigh ?
- In 88 ounces of sugar how many pounds ?
- What part of an ounce is 1 dram?* — are 5 drs. ? — 8 drs. ?
- What part of a pound are 2 ounces?* — 5 oz. ? — 7 oz. ? — 8 oz. ? — 10 oz. ? — 12 oz. ?
- What is the value of ½ of a pound?* — ½ lb. ? — ¾ lb. ? — ⅝ lb. ? — ⅞ lb. ? — ⅙ lb. ? — ⅓ lb. ?
- What part of a ton are 50 lbs. ?* — 325 lbs. ? — 250 lbs. ?

II. TROY WEIGHT.

Troy weight is used where great accuracy is required, as in weighing gold, silver, and jewels. The denominations are pounds, ounces, pennyweights, and grains.

TABLE.

24 grains (gr.)	make 1 pennyweight,	sign, pwt.
20 pennyweights	" 1 ounce,	" oz.
12 ounces	" 1 pound,	" lb.

- How many grains in 2 pennyweights?* — 6 pwts. ? — 2 pwts. 5 grs. ? — 7 pwt. 8 grs. ? — 4 pwts. 4 grs. ?
- How many pennyweights in 12 oz. ?* — 2 oz. 7 pwts. ?
- How many ounces in 4 pounds?* — 2 lbs. 8 oz. ?
- How many pennyweights in 48 grains?* — 72 grs. ?
- Reduce 60 pennyweights to ounces.* — 47 pwts.
- Reduce 48 ounces to pounds.* — 84 oz. — 150 oz.
- What part of a pennyweight are 2 grs. ?* — 5 grs. ? — 10 grs. ?
- What part of an ounce are 3 pennyweights?* — 8 pwts. ? — 15 pwts. ?

23. What part of a pound are 3 oz. ? — 4 oz. ? — 7 oz. ?
 24. What is the value of $\frac{1}{2}$ of a pwt. ? — $\frac{1}{4}$ pwt. ? — $\frac{1}{2}$ oz. ? — $\frac{9}{16}$ oz. ? — $\frac{1}{2}$ lb. ? — $\frac{1}{4}$ lb. ?
 25. Bought a gold ring, weighing 5 pwts. 7 grs., and paid for it 3 cents a grain; how much did it cost me ?
 26. How many spoons, each weighing 5 oz., may be made from 64 lbs. of silver ?
 27. A Mexican dollar weighs 17 pwts. 7 grs; what is its weight in grains ?

LESSON IV.

Measures of Extension.

Extension has three dimensions, length, breadth, and thickness. When but one dimension of a figure is considered at a time, it is measured by

I. LINEAR MEASURE.

Linear Measure is the measure of lines. The denominations are miles, furlongs, rods, yards, feet, and inches.

TABLE.

12 inches (in.)	make 1 foot,	sign,	ft.
3 feet	" 1 yard,	"	yd.
$5\frac{1}{2}$ yards, or $16\frac{1}{2}$ feet,	" 1 rod,	"	rd.
40 rods,	" 1 furlong,	"	fur.
8 furlongs, or 320 rods,	" 1 mile,	"	mi.

1. Reduce 2 yds. to feet. — to inches.
2. Reduce 4 ft. 3 in. to inches. — 3 yds. 2 ft. 11 in.
3. Reduce 2 rds. to yds. — 8 rds. — 3 rds.
4. Reduce 5 rds. to feet. — 2 rds. 2 ft.
5. Reduce 2 fur. 10 rds. to rods. — 5 fur. 25 rds.
6. Reduce 17 in. to feet. — 32 in. — 60 in. — 97 in.
7. Reduce 40 yds. to rods.
8. Reduce 52 rds. to furlongs. — 85 rds. — 100 rds.
9. Reduce 19 furlongs to miles. — 26 fur. — 90 fur.
10. What part of a foot are 7 in. ? — $5\frac{1}{2}$ in. ?
11. What part of a yard are 2 ft. 4 in. ? — 9 in. ?
12. What part of a mile are 15 rds. ? — 40 rds. ? — 125 rds. ?
13. What is the value of $\frac{1}{2}$ ft. ? — $\frac{1}{4}$ ft. ? — $\frac{3}{4}$ ft. ?
14. What is the value of $\frac{1}{2}$ rd. ? — $\frac{1}{4}$ rd. ? — $\frac{3}{4}$ rd. ? — $\frac{1}{2}$ mi. ? — $\frac{1}{4}$ mi. ? — $\frac{3}{4}$ mi. ? — $\frac{1}{2}$ fur. ? — $\frac{1}{4}$ fur. ?
15. Albert has a ball, which measures 8 inches round the outside; how many times will it turn over in rolling across a floor 9 ft. 4 in. in length ?
16. A carpenter has a square, the longest side of which is 2 feet; how many times must he lay this side down to measure the length of a board fence 6 rods long ?

CLOTH MEASURE.

Cloth measure is a species of linear measure, being used to measure cloth and other goods sold by the yard in length, without regard to width. The denominations are ells, yards, quarters, nails, and inches.

TABLE.

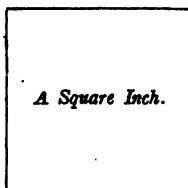
$2\frac{1}{2}$ inches (in.)	make 1 nail,	sign,	na.
4 nails, or 9 inches,	" 1 quarter,	"	qr.
4 quarters, or 36 inches,	" 1 yard,	"	yd.
8 quarters	" 1 ell Flemish,	"	E. Fl.
5 quarters	" 1 ell English,	"	E. E.
6 quarters	" 1 ell French,	"	E. Fr.

17. In 3 qrs. 3 na. of satin how many nails ?
18. In $1\frac{1}{2}$ qrs. of velvet how many inches ?
19. In 3 yds. 1 qr. of tape how many quarters ? How many nails ?
20. In 7 yds. 2 qrs. of sheeting how many inches ?
21. In 3 E. Fl. 1 qr. of linen how many quarters ? How many yards ?
22. In 2 E. E. of English broadcloth how many yards ?
23. In 4 E. Fr. 5 qrs. of French broadcloth how many yards ?
24. Reduce 21 qrs. to yds. To E. Fl. To E. E. To E. Fr.
25. Reduce 39 na. to E. E. To yds. To E. Fr. To E. Fl.
26. 1 inch is what part of 1 na. ? — of 1 qr. ? — of 1 yd. ? — of 1 E. Fl. ? — of 1 E. E. ? — of 1 E. Fr. ?

27. 3 nails are *what part* of 1 qr. ? — of 1 yd. ? — of 1 E. Fr. ? — of 1 E. E. ? — of 1 E. Fl. ?
 28. 2 quarters are *what part* of 1 yd. ? — of 1 E. E. ? — of 1 E. Fr. ? — of 1 E. Fl. ?
 29. 1 E. Fl. is *what part* of 1 yd. ? — of 1 E. E. ? — of 1 E. Fr. ?
 30. *What is the value* of $\frac{1}{2}$ na. ? — $\frac{1}{2}$ qr. ? — $\frac{1}{8}$ qr. ?
 31. *What is the value* of $\frac{1}{2}$ yd. ? — $\frac{1}{2}$ yd. ? — $\frac{1}{2}$ yd. ? — $\frac{1}{2}$ yd. ? — $\frac{1}{8}$ yd. ? — $\frac{1}{2}$ yd. ? — $\frac{1}{8}$ yd. ? — $\frac{1}{2}$ yd. ?
 32. *What is the value* of $\frac{1}{2}$ E. Fl. ? — $\frac{1}{2}$ E. E. ? — $\frac{1}{2}$ E. Fr. ?

LESSON V.

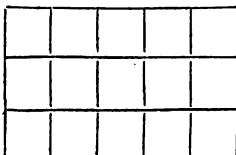
II. SQUARE MEASURE.



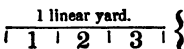
A square is a figure having four equal sides, and each of the four corners a square corner.

If one side of the figure be 1 inch long, it is called a square inch; if one foot long, a square foot; if a yard long, a square yard, &c.

A figure having four sides, the opposite sides equal, and each of the four corners a square corner, is called a rectangle, or a parallelogram.

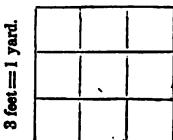


A square rod is a square measuring 1 rod on each side, like one of those in the annexed diagram. We see from the diagram that there are as many squares in a row as there are rods on one side, and as many rows as there are rods on the other side; that is, 5 rows of three squares in a row, or three rows of 5 squares in a row.



It takes three feet in length to make 1 linear yard.

3 feet = 1 yard.



But it requires a square 3 feet = 1 linear yard in length, and 3 feet = 1 linear yard in breadth, to make one square yard. 3 feet in length and 1 foot in width make 3 square feet, (3 squares in a row.) 3 feet in length and 2 feet in width make $3 \times 2 = 6$ square feet, (2 rows of squares.) 3 feet in length and 3 feet in width make $3 \times 3 = 9$ square feet, (3 rows of squares.)

It is plain, also, that 1 square foot, that is, a square 12 inches in length and 12 inches in breadth, must contain $12 \times 12 = 144$ square inches, (12 rows, of 12 squares each.)

Square measure is used in measuring land, and other things wherein length and breadth are considered. The denominations are miles, acres, roods, rods or poles, yards, feet and inches.

TABLE.

	make 1 square foot,	sign,	sq. ft.
144 square inches (sq. in.)	" 1 square yard,	"	sq. yd.
9 square feet	" 1 square rod, perch, or pole,	"	sq. rd. or P.
80 $\frac{1}{2}$ square yards, or 77 $\frac{1}{2}$ square feet,	" 1 rood,	"	R.
640 square rods	" 1 acre,	"	A.
4 roods, or 160 square rods,	" 1 square mile,	"	sq. mi.
64 acres			

1. How many square feet in 2 sq. yds. ? — 7 sq. yds. ? — 8 sq. yds. 5 sq. ft. ? — 6 sq. yds. 2 sq. ft. ?
2. How many square yards in 2 sq. rds. ? — in 3 P. ? — in 6 P. 8 sq. ft. ?
3. How many square rods in 2 R. ? — in 3 R. 12 sq. rds. ? — in 1 R. 25 sq. rds. ? — in 2 A. ?
4. How many square feet in 150 sq. in. ?
5. How many square yards in 12 sq. ft. ? — in 42 sq. ft. ?
6. How many acres in 200 sq. P. ? — in 170 sq. P. ?
7. How many square inches in a board 8 inches long and 3 inches wide ?

SOLUTION. A board of any given length and 3 inches wide must contain 3 times as many square inches as a board of the same length and 1 inch wide; a board 8 inches long and 1 inch wide contains 8 square inches, and a board of the same length and 3 inches wide must contain 3 times 8 square inches, which = 24 square inches. Therefore, a board 8 inches long and 3 inches wide contains 24 square inches.

8. How many pieces of paper, 1 inch square, can be cut from a sheet of paper 16 inches long and 12 inches wide.

9. How many square yards of carpeting will be required to cover the floor of a room 6 yards long and 5 yards wide ?

10. How many square rods of ground in a garden 15 rods long and 8 rods wide ?

11. A man has a piece of land 40 rods long and 8 rods wide; how many square rods does it contain ? — how many acres ?

12. A board 5 inches wide contains 55 square inches; what is its length ?

SOLUTION. A board of any length and 1 inch wide contains $\frac{1}{3}$ as many square inches as a board of the same length and 3 inches wide; since a board of a certain length and 3 inches wide contains 55 square inches, a board of the same length and 1 inch wide contains $\frac{1}{3}$ of 55 square inches, which = 11 square inches. Therefore, a board 5 inches wide, and containing 55 square inches, must be 11 inches long.

13. What is the length of a piece of zinc which will cover a space of 84 square inches, the width being 7 inches ?

14. The floor of a room 6 yards wide is covered with 48 square yards of carpeting; how many yards is the room in length ? How many feet ?

15. A board 12 inches long contains 108 square inches; what is its width ?

16. A board 11 feet long contains 27 $\frac{1}{2}$ square feet; what is its width ?

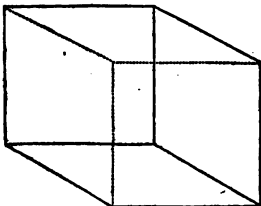
17. What is the value of $\frac{1}{2}$ sq. ft. ? — $\frac{1}{2}$ sq. yd. ? — $\frac{1}{2}$ sq. rd. ? — $\frac{1}{2}$ R. ? — $\frac{1}{2}$ A. ?

LESSON VI.

III. CUBIC OR SOLID MEASURE.

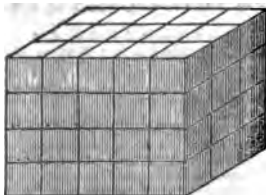
A solid is a body having length, breadth, and thickness. A cube is a figure having 6 equal sides, and each side a perfect square.

A Cubic Inch.

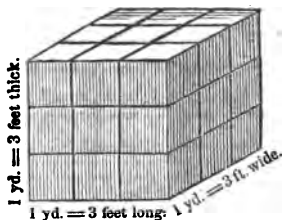


If one side of the figure measure 1 square inch, the figure is called a cubic inch. A figure 1 foot long, 1 foot wide, and 1 foot thick, is called a cubic, or solid foot.

A solid, whose ends are parallel and equal squares or rectangles, and whose sides are rectangles, is called a prism.



The annexed diagram may represent a pile of wood 5 feet long, 3 feet wide, and 4 feet high. By carefully inspecting the diagram, we may see that a portion of wood 5 feet long, 1 foot wide, and 1 high, will contain 5 solid feet. Multiplying 5 solid feet by 3, we get the contents of a portion 5 feet long, 3 feet wide, and 1 foot high. $5 \times 3 = 15$ solid feet; and multiplying 15 solid feet by 4, we get the contents of the whole pile, $15 \times 4 = 60$ solid feet.



A block 3 feet long, 3 feet wide, and 3 feet thick, is a cubic yard. The accompanying figure represents such a block.

Were a portion 1 foot in thickness cut off from the top of this block, the part cut off would be 3 feet long, 3 feet wide, and 1 foot thick, and would contain $3 \times 3 \times 1 = 9$ cubic feet.

The bottom part, being 3 feet long, 3 feet wide, and 2 feet thick, would contain $3 \times 3 \times 2 = 18$ cubic feet.

But the entire block, being 3 feet long, 3 feet wide, and 3 feet thick, contains $3 \times 3 \times 3 = 27$ cubic feet.

It is plain also, that a cubic foot, that is, a solid body, 12 inches long, 12 inches wide, and 12 inches thick, will contain $12 \times 12 \times 12 = 1728$ cubic or solid inches.

Cubic or Solid Measure is used in measuring things that have length, breadth, and thickness, such as timber, wood, earth, stone, &c.

The denominations are cords, tons, yards, feet and inches.

TABLE.

1728 cubic inches (cu. in.)	make 1 cubic foot	sign,	cu. ft.
27 cubic feet	" 1 cubic yard,	"	cu. yd.
50 feet of round timber, or 40 feet of hewn timber,	" 1 ton,	"	T.
42 cubic feet	" 1 ton of shipping,	"	T.
16 cubic feet	" 1 cord foot, or	"	C. ft.
8 cord feet, or 128 cubic feet,	" 1 foot of wood,	"	C.
	" 1 cord of wood,	"	C.

1. How many cubic inches in 2 cubic feet? — In 1 cu. ft. 36 cu. in.?
2. How many cubic feet in 3 cu. yds.? — In 2 cu. yds. 8 cu. ft.
3. How many cubic feet in 2 C. ft.? — 3 C. ft. 5 cu. ft.?
4. In 2 cords of wood how many cord feet? — In 5 C.? — In 4 C. 7 C. ft. — In 7 C. 4 C. ft.?
5. How many cubic feet in 3 cords of wood? — In 2 C. 10 cu. ft.?
6. How many cubic yards in 35 cu. ft.? — In 85 cu. ft.?
7. In a pile of wood containing 40 cubic feet, how many cord feet?
8. Reduce 70 C. ft. of wood to cords. — 200 cu. ft.?
9. How many cubic inches in a block of wood 6 inches long, 4 inches wide, and 2 inches thick?

SOLUTION. A block 4 inches wide, 1 inch thick, and of any given length, must contain 4 times as many cubic inches as a block of the same length, 1 inch wide, and 1 inch thick; a block 6 inches long, 1 inch wide, and 1 inch thick, contains 6 cubic inches, and a block of the same length and thickness, and 4 inches wide, must contain 4 times 6 cubic inches, which = 24 cubic inches; a block of any given length and width, and 2 inches thick, will contain 2 times as many cubic inches as a block of the same length and width, and only 1 inch thick; since a block 6 inches long, 4 inches wide, and one inch thick, contains 24 cubic inches, a block of the same length, and width, and 2 inches thick, must contain 2 times 24 cubic inches, which = 48 cubic inches. Therefore, a block of wood 6 inches long, 4 inches wide, and 2 inches thick, contains 48 cubic inches.

10. How many cubic feet in a load of hay 12 feet long, 5 feet wide, and 4 feet high?
11. How many bricks in a pile 20 bricks long, 10 bricks wide, and 5 bricks high?

12. How many cubic blocks, of 1 cubic inch each, can be put into a box 8 inches long, 4 inches wide, and 6 inches deep? How many blocks 2 inches long, 2 wide, and 2 thick, will the box contain?

13. *How many cubic feet in $\frac{1}{2}$ C. ? — in $\frac{1}{4}$ C. ? — in $\frac{1}{8}$ C. ?*

LESSON VII.

Measures of Capacity.

I. WINE MEASURE.

Wine Measure is used in measuring all liquids except ale, beer, and milk. The denominations are tuns, pipes, hogsheads, tierces, barrels, gallons, quarts, pints, and gills.

TABLE.

4 gills (gi.)	make 1 pint,	sign,	pt.
2 pints	" 1 quart,	"	qt.
4 quarts	" 1 gallon,	"	gal.
$2\frac{1}{2}$ gallons	" 1 barrel,	"	bar.
42 gallons, or $1\frac{1}{2}$ barrels,	" 1 tierce,	"	tier.
63 gallons, or 2 barrels,	" 1 hogshead,	"	hhd.
2 hogsheads	" 1 pipe,	"	P.
2 pipes, or 4 hogsheads,	" 1 tun,	"	T.

1. *How many gills in 5 pts. ? — in 7 pts. ? — in 12 pts. ?*
2. In 3 qts. 1 pt. of oil how many pints? How many gills?
3. How many gills in 7 qts. 1 pt. 3 gi. of molasses?
4. In 3 gallons of vinegar how many quarts? — in 9 gal. 3 qts. ?
5. *How many gallons in 3 bar. ? — in 2 bar. 10 gal. ?*
6. *How many gallons in 3 hogsheads of sugar? — in 2 hhds. 5 gal. ?*
7. *How many pints in 7 gi. ? — in 12 gi. ? — in 35 gi. ?*
8. *How many quarts in 10 pts. ? — in 40 gi. ? — in 17 gi. ?*
9. *How many gallons in 31 qts. ? — in 32 pts. ? — in 64 gi. ?*
10. *How many barrels in 70 gal. ? — in 36 gal. ?*
11. *How many hogsheads in 5 bar. ? — in 120 gal. ?*
12. *What is the value of $\frac{1}{2}$ pt. ? — of $\frac{1}{4}$ pt. ? — of $\frac{1}{8}$ qt. ? — of $\frac{1}{4}$ qt. ? — of $\frac{1}{8}$ qt. ? — of $\frac{1}{4}$ gal. ? — $\frac{1}{2}$ gal. ? — $\frac{3}{4}$ gal. ?*
13. How many times can a jug, holding 5 quarts, be filled from 3 gal. 3 qts. of molasses?
14. A painter has 2 jugs of varnish; one jug contains 2 gal. 1 qt., and the other 1 gal. 3 qts. 1 pt.; how many quarts of varnish in the 2 jugs? How many pints?

II. BEER MEASURE.

Beer Measure is used in measuring beer, ale, and milk. The denominations are hogsheads, barrels, gallons, quarts, and pints.

TABLE.

2 pints (pts.)	make 1 quart,	sign,	qt.
4 quarts	" 1 gallon,	"	gal.
36 gallons	" 1 barrel,	"	bar.
54 gallons, or $1\frac{1}{2}$ barrels,	" 1 hogshead,	"	hhd.

15. *How many pints of ale in 3 qts. ? — in 2 qts. 1 pt. ?*
16. *How many quarts of milk in 5 gal. ? — in 4 gal. 3 qts. ? — in 8 gal. ?*
17. *How many gallons of beer in 2 bar. 12 gal. ? — in 3 hhds. ?*
18. In 5 gallons of milk how many pints?
19. *How many quarts of milk in 7 pts. ? — in 15 pts. ?*
20. *How many gallons of ale in 6 qts. ? — in 18 qts. ? — in 36 qts. ?*
21. *How many barrels of beer in 40 gal. ? — in 75 gal. ?*
22. *How many hogsheads of milk in 60 gal. ? — in 108 gal. ? — in 7 bar. ? — in 12 bar. ?*
23. *What part of a gallon are 3 quarts? — 2 qts. 1 pt. ?*
24. *What part of a barrel are 5 gallons? — 12 gal. ?*

III. DRY MEASURE.

Dry Measure is used in measuring all kinds of grain, fruit, roots, (such as potatoes and turnips,) salt, charcoal, &c. The denominations are chaldrons, quarters, bushels, pecks, quarts, and pints.

TABLE.

2 pints (pts.)	make 1 quart,	sign,	qt.
8 quarts	" 1 peck,	"	pk.
4 pecks	" 1 bushel,	"	bu.
8 bushels	" 1 quarter,	"	qr.
36 bushels	" 1 chaldron,	"	ch.

NOTE. The quarter of 8 bushels is an English measure.

25. In 3 pecks of clover seed how many quarts? How many pints?
26. How many pecks in 4 bushels of potatoes? — in 3 bu. 3 pks.?
27. How many quarts in 2 bushels of oats? — in 1 bushel 3 pks. 2 qts.?
28. In 4 quarters of corn how many bushels?
29. In 42 quarts of barley how many pecks? How many bushels?
30. How many bushels in 17 pecks of wheat? — in 63 pks.?
31. What part of a peck are 3 qts.? — 7 qts.? — 2 qts. 1 pt.?
32. What part of a bushel are 2 pks.? — 3 pks.? — 1 pk. 4 qts.?
33. What is the value of $\frac{1}{2}$ pk.? — of $\frac{1}{4}$ pk.? — of $\frac{1}{8}$ bu.? — of $\frac{1}{16}$ bu.? — of $\frac{1}{32}$ ch.?

LESSON VIII.

Time.

Time is the measure of duration. The denominations are years, months, weeks, days, hours, minutes, and seconds.

TABLE.

60 seconds (S.)	make 1 minute,	sign,	m.
60 minutes	" 1 hour,	"	h.
24 hours	" 1 day,	"	d.
7 days	" 1 week,	"	w.
52 weeks 1 day, or 365 days,	" 1 common year,	"	yr.
52 weeks 2 days, or 366 days,	" 1 leap year,	"	yr.

The year is also divided into 12 calendar months, which, in the order of their succession, are named and numbered as follows:

January, 1st month, has 31 days, sign,	Jan.	July, 7th month, has 31 days, sign,	July.
February, 2d " " 28 days, "	Feb.	August, 8th " " 31 days, "	Aug.
March, 3d " " 31 days, "	Mar.	September, 9th " " 30 days, "	Sept.
April, 4th " " 30 days, "	Apr.	October, 10th " " 31 days, "	Oct.
May, 5th " " 31 days, "	May.	November, 11th " " 30 days, "	Nov.
June, 6th " " 30 days, "	June.	December, 12th " " 31 days, "	Dec.

NOTE. When any year can be divided by 4 without a remainder, it is called leap year, in which February has 29 days.

The number of days in each month may be easily remembered from the following lines:

Thirty days hath September,
April, June, and November;
All the rest have thirty-one,
Save February, which alone
Hath twenty-eight; and one day more
We add to it one year in four.

1. How many seconds in 2 minutes? — in 5 m.? — in 3 m. 10 s.? — in 4 m. 15 s.?
2. How many minutes in 2 hours? — in 6 h. 30 m.?
3. How many hours in 2 days? — in 4 d.? — in 1 week, or 7 days? — in 3 d. 8 h.? — in 5 d. 16 h.?
4. How many days in 9 weeks? — in 12 w. 4 d.?
5. How many minutes in 80 seconds? — in 100 s.?
6. Reduce 200 minutes to hours.
7. How many days in 30 hours? — in 51 hours? — in 72 hours?
8. How many weeks in 12 days? — in 52 d.? — in 89 d.? — in the month of Jan.? — in the month of July?
9. What part of a minute are 10 seconds? — 24 s.? — 45 s.?
10. What part of an hour are 7 minutes? — 30 m.? — 2 m. 5 s.?
11. What part of a day are 9 h.? — 20 h.? — 6 h.?
12. What part of a week are 4 d.? — 6 d.? — 3½ d.?
13. What part of a common year are 30 d.? — 90 d.?
14. What part of a leap year are 54 d.? — 72 d.?
15. What is the value of $\frac{1}{4}$ m.? — $\frac{1}{8}$ h.? — $\frac{1}{16}$ d.? — $\frac{1}{32}$ w.? — $\frac{1}{64}$ h.? — $\frac{1}{128}$ h.?

16. *How many weeks in Jan., Feb., and Mar.?* — in a common year? — in a leap year.

17. *How many minutes will you gain in a week, by rising 25 minutes earlier each morning?* *How many hours?*

18. *If you are idle 10 minutes each hour in school, and are in school 6 hours each day, how much time do you lose by idleness in 1 day?*

19. *If you attend school $5\frac{1}{2}$ days each week, how much time do you lose in a week?*

LESSON IX.

Miscellaneous Table.

32 units	make	1 score.	100 lbs. of raisins	make	1 cask.
5 score	"	1 hundred.	100 lbs. of fish	"	1 quintal.
12 units	"	1 dozen.	18 inches	"	1 cubit.
12 doz. = 144	"	1 gross.	22 inches, nearly,	"	1 sacred cubit.*
12 gross = 144 doz.	"	1 great gross.	1 gallon of train oil	"	7 $\frac{1}{2}$ lbs.
200 lbs. of beef, pork, or fish,	"	1 barrel.	1 gallon of molasses	"	11 lbs.
128 lbs. of flour	"	1 barrel.	24 sheets of paper	"	1 quire.
8 bushels of salt	"	1 hoghead.	20 quires	"	1 ream.
200 lbs. of salt at the ?	"	1 barrel.	2 reams	"	1 bundle.
salt works in N. Y. †	"		5 bundles	"	1 bale.
A sheet folded in 2 leaves, or 4 pages,		is called			a folio.
A sheet folded in 4 leaves, or 8 pages,		"			a quarto, or 4to.
A sheet folded in 8 leaves, or 16 pages,		"			an octavo, or 8vo.
A sheet folded in 12 leaves, or 24 pages,		"			a duodecimo, or 12mo.
A sheet folded in 16 leaves, or 32 pages,		"			an 18mo.
A sheet folded in 24 leaves, or 48 pages,		"			a 24mo.

1. A man, being asked his age, said that he was 2 score and five years old; how many years old was he?

2. A boy bought 3 oranges, for which he gave 3 dozen filberts apiece; how many filberts did he give for all the oranges?

3. A tailor bought 3 gross of buttons; how many buttons did he buy?

4. A man killed 2 hogs, which weighed 360 pounds each; how many barrels of pork did they make?

5. A man killed a fat cow, which weighed 825 pounds; how many barrels of beef did she make?

6. How many pounds in 3 barrels of flour?

7. A man bought 3 barrels of N. Y. salt, at $\frac{1}{2}$ cent a pound; how many pounds did he buy, and how many dollars did it cost him?

8. A baker used 50 pounds of flour for a bushel of crackers; how many barrels would he use in making 8 bushels, at that rate?

9. Bought 24 quintals of fish, at 4 cents a pound; how many dollars did it cost me?

10. I have a cask which contains 5 gallons of train oil; the cask alone weighs 20 pounds; how much do the cask and oil weigh?

11. A jug, which will hold 24 gallons, weighs 6 pounds; how much will it weigh when filled with molasses?

12. How many writing books, each containing 5 sheets, can be made from 34 quires of writing paper?

13. How many quires of good paper in 1 bundle, allowing each ream to contain 1 quire of poor paper?

14. How many sheets of paper in a book of 108 pages, duodecimo size?

15. In $4\frac{1}{2}$ hogheads of salt how many bushels?

16. In 24 barrels of beef how many pounds?

17. In $2\frac{1}{2}$ quintals of fish how many pounds?

18. How many years in 3 score and 10 years?

19. *How many feet in 6 cubits?* — in 34 cubits?

LESSON X.†

1. A man paid \$75 for a pound of tea, \$20 for 2 pounds of sugar, \$15 for a pound of coffee, and \$08 for an ounce of indigo; how many dollars did he pay out?

2. A boy bought a knife for 1 shilling 9 pence, and a comb for one shilling 6 pence; how much did he give for both?

SOLUTION. He gave 1s. 9 + 1s. 6d.; 1s. + 1s. = 2s.; 9 d. + 6 d. = 15d. or 1s. 3d., and 2s. + 1s. 3d. = 3s. 3d. Therefore, he gave 3s. 3d. for both.

* A sacred cubit is 21 $\frac{2}{3}$ inches.

† See Note 1b.

3. A confectioner sold to one boy 6 ounces of candy, to another boy 5 oz., to another 12 oz., to another 4 oz., and to another 8 oz.; how many pounds of candy did he sell to all?

4. A silversmith bought of a lady an old silver spoon, which weighed 2 oz. 5 pwt., 3 teaspoons, which weighed 1 oz. 19 pwt., and other old silver to the amount of 3 oz. 10 pwt.; what was the weight of the whole?

5. Joseph walked 10 rods in 25 seconds, 10 rods more in 30 seconds, and 10 rods more in 45 seconds; how many rods did he walk, and how many minutes did it take him?

6. David jumped 3 jumps; the length of the first jump was 8 ft. 6 in., of the second 9 ft. 10 in., and of the third 11 ft. 2 in.; how many feet did he jump? — how many rods?

7. Thomas has two strings; one of them is 1 yd. 2 ft. 6 in. long, and the other 2 yds. 1 ft. 8 in.; what is their united length?

8. A grocer sold at one time 2 qts. of molasses, at another time 3 qts., at another 1 qt., at another 3 qts., and at another 2 qts.; how many gallons did he sell?

9. A brewer put 2 gal. 3 qts. 1 pt. of beer into a jug, and 3 qts. into a bottle; how much did he put into both?

10. A man, having \$275, expended \$125; how much money had he left?

11. A boy, having 4s. 9d., paid 2s. 3d. of it for a book; how much money had he left?
SOLUTION. He had left the difference between 4s. 9d., and 2s. 3d.; 4s. — 2s. = 2s.; 9d. — 3d. = 6d., and 2s. + 6d. = 2s. 6d. Therefore, he had 2s. 6d. left.

12. A woman bought 10 lbs. 12 oz. of sugar, and used 3 lbs. 5 oz. in making cake; how much sugar had she left?

13. From 7 oz. 15 pwt. 12 gra. take 4 oz. 10 pwt. 7 gra.

14. From a piece of tape, containing 9 yds. 3 grs., a clerk sold 4 yds. 1 qr.; how much remained in the piece?

15. A woman, having 6 lbs. of butter, sold 3 lbs. 10 oz.; how much had she left?

SOLUTION. She had left the difference between 6 lbs. and 3 lbs. 10 oz. Since there are no oz. in the larger number, from which to take the 10 oz. in the smaller number, we make the 6 lbs. 1 less; 5 lbs. — 3 lbs. = 2 lbs.; the 1 lb. which we took from the 6 lbs. = 16 oz., and 16 oz. — 10 oz. = 6 oz.; then 2 lbs. + 6 oz. = 2 lbs. 6 oz. Therefore, she had 2 lbs. 6 oz. left.

16. A shoemaker engaged to work 4 w. 3 d. for 30 dollars; after working 3 w. 4 d., how much longer must he work to make out his time?

17. James had a string 12 ft. 3 in. long, and he cut off 5 ft. 8 in. of it to hang his kite with; how long was the rest of the string?

18. A man bought 7 gal. 1 qt. of molasses, and after getting home, he found that 2 gal. 2 qts. had leaked out of the cask; how many gallons remained?

19. A farmer, having 19 bu. 3 pks. of wheat, sold 5 bu. 1 pk. 4 qts.; how much had he left?

LESSON XI.

1. A man bought 2 yards of cloth, at 1s. 9d. a yard; how much did it cost him?
SOLUTION. 2 yards cost 2 times as much as 1 yard; since 1 yard cost 1s. 9d., 2 yards cost 2 times 1s. 9d.; 2 times 1s. are 2s., and 2 times 9d. are 18d. or 1s. 6d., which, added to the 2s., make 3s. 6d. Therefore, it cost him 3s. 6d.

2. How much powder in 3 canisters, each containing 1 lb. 8½ oz.?

3. If 1 silver spoon weighs 3 oz. 5 pwt., how much will 6 silver spoons weigh?

4. There is a square figure, one side of which measures 2 feet 5 inches; what is the distance round it?

5. A man has 3 pieces of cloth, each measuring 10 yds. 3 qrs.; how many yards in the whole?

6. If a man can cut 2 C. 5 C. ft. of wood in 1 day, how many cords can he cut in a week?

7. A man has 5 bottles, each containing 2 gal. 3 qts. 1 pt. of wine; how much wine do they all contain?

8. If a man drink 2 gal. 3 qts. of beer in 1 week, how much will he drink in 4 weeks?

9. A farmer has 12 bags, each of which will hold 2 bu. 1 pk. 4 qts.; how much wheat can he put into all of them?

10. Lucas worked in the garden from 8 o'clock 30 minutes in the morning till 12 o'clock at noon, each working day for a week; how many hours did he work in all?

11. Paid 3s. 6d. for two yards of linen; how much was it a yard?

SOLUTION. 1 yard cost $\frac{1}{2}$ as much as 2 yards; since 2 yards cost 3s. 6d., 1 yard must have cost $\frac{1}{2}$ of 3s. 6d.; 3s. 6d. = 2s. + 1s. 6d., and 1s. 6d. = 18d.; then, $\frac{1}{2}$ of 2s. = 1s., and $\frac{1}{2}$ of 18d. = 9d., which, added to 1s., makes 1s. 9d. Therefore, the cloth was 1s. 9d. a yard.

12. If 4 lbs. 8½ oz. of tea be put into 3 equal parcels, how many pounds will 1 parcel contain?

13. A silversmith sold 6 silver spoons, which weighed 1 lb. 7 oz. 10 pwt.; how much did 1 spoon weigh?
14. A man made a square frame, which measured 6 ft. 8 in. round the outside; what was the length of 1 side?
15. If three equal pieces of cloth contain 32 yds. 1 qr., how much does each piece contain?
16. A man chopped 15 C. 6 C. ft. of wood in 1 week; how much was that a day?
17. A man has 11 gal. 3 qts. 1 pt. of wine, which he wishes to put into 5 bottles; how much must he put into each bottle?
18. A toper drank 11 gal. 1 qt. of rum in 5 weeks; how much was that a week?
19. A farmer would put 28 bu. 2 pks. of wheat into 12 bags; how much must be put into each bag?
20. A boy, having 21 hours' work to perform, was 6 days in performing it; how many hours did he work each day?

MISCELLANEOUS EXAMPLES.*

1. A man bought a carriage for 80 dollars, and after spending 10 dollars in repairs, he sold it for $\frac{1}{3}$ of what it cost him; how much did he make by the transaction?
2. A hardware merchant sold 20 pounds of iron, at 6 cents a pound, and took his pay in butter, at 12 cents a pound; how many pounds of butter did he receive?
3. A man, owing \$150, paid at one time \$30, at another time \$25, at another time \$45, and at another time $\frac{1}{2}$ of the remainder; how much was the last payment?
4. One man travels 75 miles a day, and another 60 miles a day; if they both start from the same place at the same time, and travel the same way, how far apart will they be in 3 days?
5. What is the difference between twice 5 and 20 and twice 25?
6. If a man earn \$45 in 6 months, how many months must he work to earn \$270?
7. Paid \$22 $\frac{1}{2}$ for 7 $\frac{1}{2}$ weeks' board; how many weeks' board can I have for \$50, at the same rate?
8. If 1 yard of fustian costs $\frac{1}{3}$ of a dollar, how much will 20 yards cost?
9. A draper has 3 pieces of broadcloth, which contain respectively 5 $\frac{1}{2}$ yds., 8 $\frac{1}{2}$ yds., and 6 $\frac{1}{2}$ yds.; how many yards in the 3 pieces?
10. How many coats can be cut from each of the above pieces, allowing 2 $\frac{1}{2}$ yds. to each coat?
11. If a man travel 3 $\frac{3}{4}$ miles an hour, how far will he travel in 2 days of 10 hours each?
12. At $\frac{1}{3}$ of a dollar for $\frac{1}{4}$ of a pound of powder, how much will 2 pounds cost?
13. At $\frac{1}{3}$ of a dollar a bushel, how many bushels of peaches can be bought for \$12?
14. If 3 $\frac{1}{2}$ bushels of apples cost $\frac{1}{3}$ of a dollar, how much will 1 bushel cost?
15. At $\frac{1}{3}$ of a dollar for 4 pounds of tobacco, how much will 7 $\frac{1}{2}$ pounds cost?
16. If 4 acres of land produce 83 bushels of corn, how many bushels will 10 acres produce?
17. A man bought a quantity of sugar for \$3 \cdot 20, paying at the rate of 37 $\frac{1}{2}$ cents for 5 $\frac{1}{2}$ pounds; how many pounds did he buy?
18. Bought a cow for \$12 $\frac{1}{2}$, and sold her for \$14 $\frac{1}{2}$; I laid out what I gained by the transaction for potatoes, at \$ \cdot 20 a bushel; how many bushels of potatoes did I purchase?
19. A man, having 2 half eagles, bought a barrel of flour for \$6 \cdot 50; how much money had he left?
20. If 9 pounds of raisins cost \$1, how many cents will 1 pound cost?
21. A lady bought 2 $\frac{1}{2}$ yards of cambric, at \$ \cdot 14 a yard, and gave the shopkeeper a half dollar; how much change should she receive?
22. How much rice at 7 cents a pound, can be bought for 5 $\frac{5}{12}$ dozens of eggs, at 10 cents a dozen?
23. If a man earn \$1 $\frac{1}{4}$ in 1 day, how many dollars and cents will he earn in 5 $\frac{1}{2}$ days?
24. How can you place 8 kernels of corn in 4 rows, and have each row contain 3 kernels?
25. A boy bought 2 slates, at 2s. 9d. each; how many shillings did they cost him?
26. In 320 inches how many yards?
27. What will 2 cwt. of sugar come to, at 6 cents a pound?
28. How much tea, at 37 $\frac{1}{2}$ cents a pound, can be bought for 1 dollar?
29. If 1 yd. 2 qrs. are required for a pair of pantaloons, and 2 yds. 2 na. for a coat, how many yards will be required for 2 pairs of pantaloons and 2 coats?

* See Note 7.

30. If a man step 2 ft. 6 in. at 1 step, how many steps must he take in walking 50 feet?
31. In 3 gal. 2 qts. 1 pt. how many pints?
32. In 40 pints how many half gallons?
33. Bought 4 bu. 3 pks. of apples at 1 time, and 6 bu. 2 pks. at another; how many bushels did I buy in all?
34. How much will 7 bu. 1 pk. of wheat come to, at \$'92 a bushel?
35. A butcher paid \$45 for a cow, a hog, and a number of sheep; for the cow he paid \$12, for the hog \$7, and for the sheep \$2 apiece; how many sheep did he buy?
36. Two men set out to perform a journey of 60 miles; one man travels 5 miles an hour, and the other 6 miles an hour; in how many hours will each man perform the journey? Which man will arrive at the journey's end first? How many hours? How far will the other man be behind him?
37. If 5 cords of wood will last a family 12 weeks, how many cords will be required to last them 7 weeks?
38. Paid \$16 for 7 bushels of grass seed; how much will 4½ bushels cost, at the same rate?
39. A bookseller sold a quire of paper for \$ $\frac{25}{100}$, a bottle of ink for \$ $\frac{5}{20}$, 4 bunches of quills for \$ $\frac{8}{32}$, and a Primary Arithmetic for \$½; for which of the articles did he receive the most?
40. A laborer earned on Monday \$ $\frac{5}{8}$, on Tuesday \$ $\frac{4}{8}$, on Wednesday \$ $\frac{5}{8}$, on Thursday \$ $\frac{3}{8}$, on Friday \$ $\frac{2}{8}$, and on Saturday \$1 $\frac{2}{8}$; he expended \$1 $\frac{1}{8}$ of his wages for flour, \$ $\frac{3}{8}$ for groceries, and \$ $\frac{2}{8}$ for wood; how much of the week's earnings had he left?
41. A young lady bought a pair of gloves for \$ $\frac{7}{10}$, 4 yards of ribbon for \$1½, 12 yards of linen gingham for \$4½, hooks and eyes and thread for \$½, and a comb for \$ $\frac{2}{10}$; she paid the merchant a 10 dollar bill; how much money should she receive in change?
42. A man carried 8 $\frac{3}{10}$ yards of cloth to a tailor, who used 5½ yards of it in making the man a suit of clothes; how much cloth remained in the piece?
43. In a certain village ½ of the houses are painted white, ¼ red, ⅓ yellow, 3 are painted brown, and 7 are unpainted; how many houses in the village?
44. A vintner put 30 gallons of wine into 1 pt. and 2 pt. bottles, of each an equal number; how many bottles did he use? How many of each kind?
45. A tinman sold 3 tin pails, which held respectively 5 qts., 8 qts., and 12 qts.; how many gallons would they all contain?
46. How many gallons in ½ hhd. of molasses? — in ½ hhd.? — in ⅓ hhd.? — in ¼ bar. of wine? — in ¼ bar. of beer?
47. Bought 3½ yards of plush, at \$1½ a yard; how much did it cost me?
48. In July, 1848, the children of the village common schools in Keene, to the number of 320, with their teachers, by invitation, met the common schools in Fitzwilliam, 12 miles distant, and joined in a pleasant pic-nic. They were transported to and from Fitzwilliam by railroad, at an expense of \$32; how many cents was that apiece? How much a mile?
49. A druggist paid \$27 for opium, at \$6½ a pound; how many pounds did he purchase?
50. A farmer sold 3 cows for a certain sum, and took in part payment 5½ yards of broadcloth, at \$3 a yard, and the balance in money; the broadcloth came to $\frac{5}{8}$ of the whole cost of the cows; how much did the cows come to? How much money did the farmer receive?
51. A man gave ½ of 40 bushels of corn for 7 sheep; how many bushels did he give apiece for them?
52. By the side of a church stands a tree, which is just as high as the church spire; now, from the ground to the ridge of the roof is 38 feet, from the ridge to the belfry 21 feet, and from the belfry to the top of the spire 56 feet; how high is the tree?
53. How many days in the last 4 months of any year?
54. Four men bought 100 acres of land as follows: the first man bought 21 acres, the second man ½ as many acres as the first, the third man as many acres as the first two, and the fourth man the rest; how many acres did the second man buy? — the third? — the fourth?
55. A hatter sold 8 silk hats, at \$4½ apiece, and 4 fur hats, at \$5½ apiece; how much did they all come to?

56. A grocer, having $\frac{1}{2}$ of a cheese, sold $\frac{1}{4}$ of what he had; what part of the whole cheese did he sell? What part had he left?

57. Bought $4\frac{1}{2}$ tons of coal, at $\$4\frac{1}{2}$ a ton; how much did it cost me?

58. From $64\frac{1}{2} \div 7$ take $26\frac{1}{2} \div 4$.

59. If 12 men eat 18 pounds of meat in 2 days, how many pounds will 4 men eat in 6 days?

60. A man bought 3 yards of broadcloth, and 5 yards of satin, for which he paid $\$19$. He paid $\$6\frac{1}{2}$ for the satin; how much did the broadcloth cost him? How much a yard? How much did a yard of the satin cost him?

METHOD OF CONDUCTING CLASSES.

TO TEACHERS. Many excellent methods of teaching Mental Arithmetic are in daily use among teachers. Some of these methods we will briefly describe, and then leave it with you to modify and improve them, and to adapt your modifications and improvements to your classes, as circumstances may require.

1st. Preparing lessons. Most teachers require their pupils to prepare their lessons before coming to recitations. In preparing lessons, pupils should perform each example in the same manner as they design to in recitation. They should also commit all the definitions and tables contained in the lesson, before the hour for recitation arrives. — Some teachers require their pupils to perform the examples contained in their lessons "at sight," i. e., without any previous preparation. This course tends to make scholars ready and practical, and may in many cases be advantageously pursued with classes of young ladies and gentlemen. But with classes of younger pupils it sometimes tends to encourage idleness, and when adopted with such classes, requires great care on the part of the teacher.

2d. Giving out examples. The books may be closed during recitation, and the questions and examples contained in the lesson may be given to the class by the teacher. Or, the books may be open, and the examples may be read by the pupils, or by the teacher. — Some teachers allow the pupil "at the head" to read and perform an example, then the pupil "next to the head," and so on, "from head to foot," thus giving each pupil an opportunity to "look out his *sum*," and have the answer ready "when his turn comes." It is better to give out questions to the pupils indiscriminately, thereby securing the attention of the whole class during the recitation. — Examples may occasionally be given, and the class be required to perform them in concert. — It is well to give an example to the class, and after giving them sufficient time for thought, call upon some member to perform it. — When an example has been given out, you may require all who think they can perform it, to raise a hand, to advance one step, to rise, or to sit, as may be expedient, and then call upon some pupil, or upon the class, to perform the example. — You may give out an example, and after giving the class sufficient time to perform it, call upon some one for the answer. If this is given correctly, require a solution; if not, call upon another, and so on, till a correct answer is obtained.

3d. Forms of solution. You should require the pupil to give a full, clear, and correct solution of each example. You need not in all cases require the form given in the book, provided the pupil can give a better one. The pupil should not be allowed to use any form of solution which he does not clearly understand.

NOTES TO TEACHERS.

PART FIRST.

NOTE 1. ADDITION. Lesson 1. Explain to the pupil the manner of using the stars at the head of the lessons in addition. Thus, the star at the left and 3 stars at the

right of it, make 4 stars, &c. The answer to the question is given before the reason, from the fact that small children give the reason *after* the answer, more readily than *before* it. — *Italic words in any example are to be repeated, in place of the dash in the following question.*

NOTE 2. Lesson 1. In giving the reason for the answers to subsequent examples, the pupil should name the thing considered in the question. Thus, example 2, *Ans. There are 6; because 4 pictures and 2 pictures are 6 pictures.*

NOTE 3. SUBTRACTION. Lesson 1. Explain to the pupil the manner of using the stars at the head of the lessons in subtraction. Thus, 7 stars (counting from the left) minus 1 star (at the left) = 6 stars. — Two forms of answer are given, the second form showing the relation of subtraction to addition.

NOTE 4. Lesson 6. The answers may generally be divided into 3 parts; viz., statement, operation, conclusion. — Thus, Ex. 1, Answer. *Statement.* They used the difference between 6 pounds and 8 pounds. *Operation.* 6 pounds from 8 pounds leaves 2 pounds. *Conclusion.* Therefore, they used 2 pounds.

NOTE 5. MULTIPLICATION. Lesson 2. The table at the head of a lesson should in all cases be committed, before the pupil proceeds to the lesson. — Two forms of solution are given, which differ in only one word. The first solution commences with *Since*, and the second with *If*. This leads us to remark, that when there is a condition in the question, expressed by *if*, there must be a corresponding condition in the answer. *If* expresses a condition, and *since* a certainty.

NOTE 6. DIVISION. Lesson 2. The pupil may be taught to commit the division table, by comparing it with the multiplication table. Thus, 2 times 1 are 2, 2 in 2 once, &c. — Answer to Ex. 1. *Since 2 cents will buy 1 lemon, as many times as 2 cents are contained in 6 cents, so many lemons can be bought; 2 cents are contained, &c., as before.* Either form of answer may be adopted.

NOTE 7. The miscellaneous exercises may be divided into lessons of appropriate length.

PART SECOND.

NOTE 8. ADDITION. Lesson 2. Explain the terms horizontal, perpendicular, and parallel.

NOTE 9. Lesson 4. First add the tens, next the units, and then add the two amounts together. In subtraction, first subtract the tens, next the units, and then add the two remainders together.

NOTE 10. Lesson 6. Do not permit the pupil to first add the units, and then the tens, as is practised in Written Arithmetic, but require him in all cases to *bring out the tens first.*

NOTE 11. SUBTRACTION. Lesson 5. Correct operations of this kind afford the only true insight into the rule for subtraction in Written Arithmetic.

NOTE 12. DIVISION. Lesson 1. Ex. 1. SOLUTION. *Since 4 boys received 12 apples, as many times as 4 is contained in 12 so many apples 1 boy received; 4 is contained in 12 three times. Therefore, 1 boy received 3 apples.* Either form of solution may be adopted.

NOTE 13. FRACTIONS. Lesson 1. In explaining the divisions of a unit, it is advisable to actually cut or divide some object, in the presence of the class.

NOTE 14. Lesson 3. The form of solution given in division should not be used here; but the solutions should correspond in form with that given to Ex. 5. — Adopt a proper form of solution for examples of the character of example 3, 7, 13, &c.

NOTE 15. Lesson 7. No pains should be spared in impressing upon the mind of the pupil the fact that $\frac{1}{2}$ of 4 is $\frac{2}{1}$ of 1, $\frac{1}{3}$ of 3 is $\frac{1}{1}$ of 1, &c.

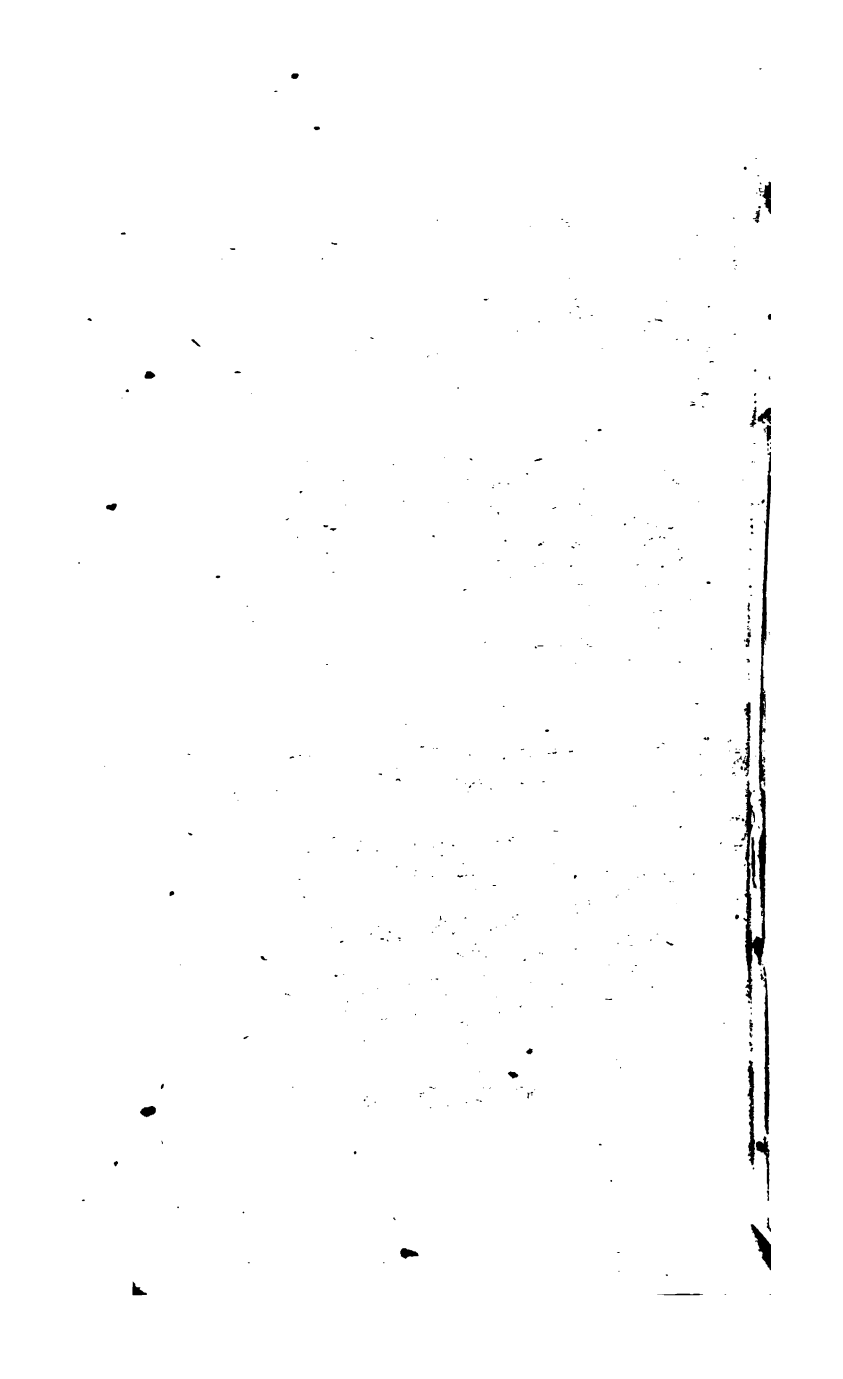
NOTE 16. Lesson 20. Ex. 8. $\frac{1}{2}$ is not 7, but $\frac{1}{2}$ of 21 is 7. $\frac{2}{3}$ are not 2 times 7, but $\frac{2}{3}$ of 21 are 2 times 7. This manner of solution is quite common. It is of more importance to correct such improprieties, than to make rapid progress and retain in use incorrect forms of solution.

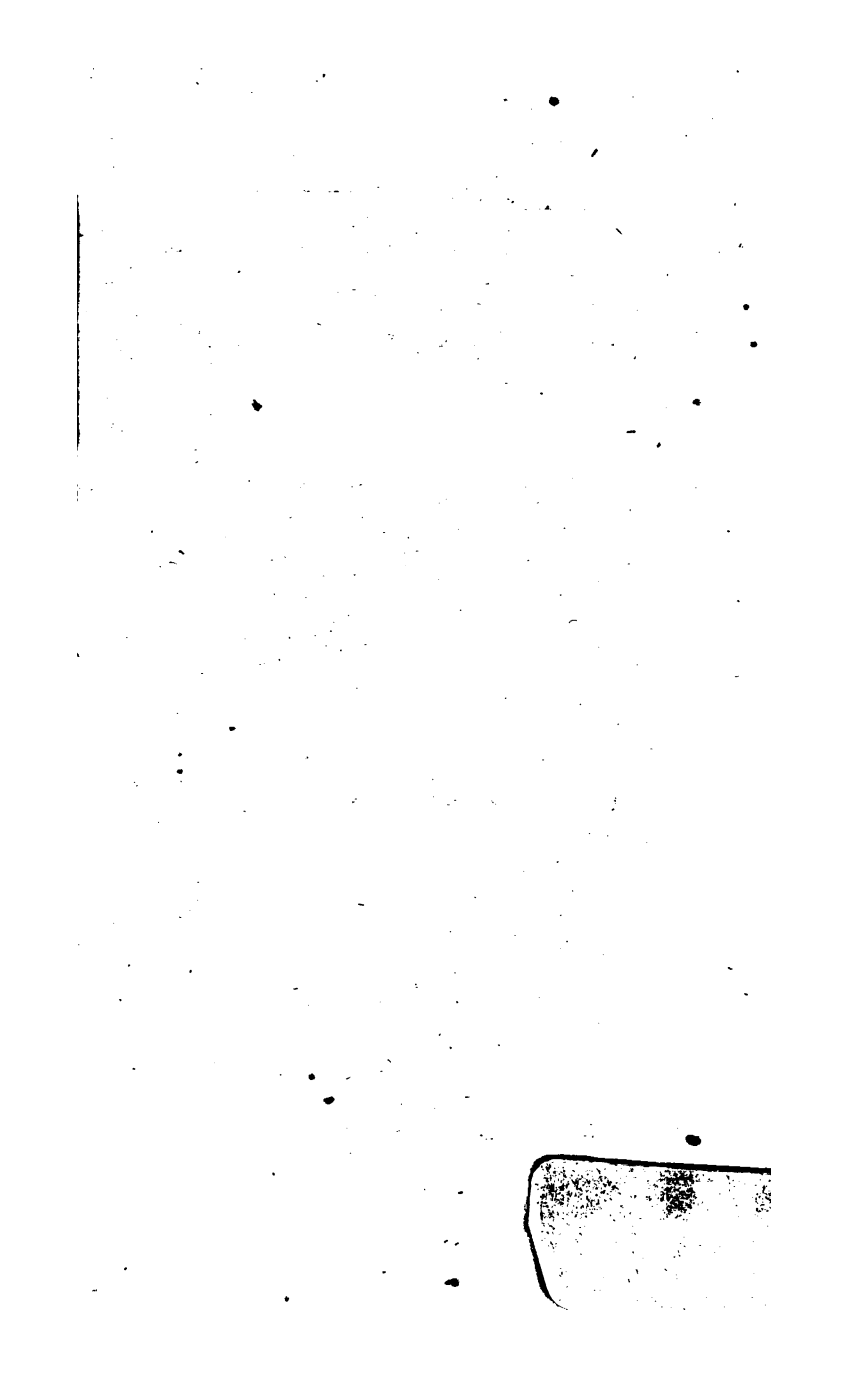
NOTE 17. Lesson 24. Explain to the pupil the object in multiplying both terms of the dividend before dividing. The multiplier may always safely be the denominator of the dividing fraction.

NOTE 18. Lesson 14. Ex. 9. SOLUTION. *Esther gathered 6 $\frac{1}{2}$ qts. — 4 $\frac{1}{2}$ qts. more than Rebecca; 6 $\frac{1}{2}$ qts. = 5 qts. + 1 $\frac{1}{2}$ qts.; 5 qts. — 4 qts. = 1 qt.; 1 $\frac{1}{2}$ qts. = $\frac{1}{2}$ qt., which — $\frac{1}{2}$ qt. = $\frac{1}{2}$ or $\frac{1}{2}$ qt., and 1 qt. + $\frac{1}{2}$ qt. = 1 $\frac{1}{2}$ qts. Therefore, Esther gathered 1 $\frac{1}{2}$ qts. more than Rebecca.* Either form of solution may be adopted.

NOTE 19. COMPOUND NUMBERS. Lesson 2. Pupils may be materially assisted in forming correct ideas of coins, weights, and measures, by referring them to some visible object of the same value, weight, or size, or by exhibiting the U. S. coins, and the different weights and measures in common use, to which reference is made in the tables.







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